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THE LYMPHATICS OF THE DENTAL REGION *

FREDERICK B. NOYES, B.A., D.D.S.
AND
KAETHE W. DEWEY, M.D.
CHICAGO

In place of the usual review of the progress of dental science and art, in the year past, which is given in a chairman's address, your chairman has decided to present a report of the work done in the Histological Laboratory of the College of Dentistry of the University of Illinois in the last three years. Two years ago, at the Detroit session, the first of this work was reported to this section.

First, I want to say that the technical work has been done by Dr. Dewey, in my laboratory, and she has prepared the review of the literature.

THE LYMPHATIC SYSTEM

Schweitzer[1] deserves the credit of first demonstrating, by injection, the presence of lymphatic vessels in the dental pulp and peridental membrane. Our work has corroborated his results, and filled out some of the gaps in his findings, especially in showing through its entire extent the drainage from the dental pulp, and the course of the vessels in the infra-orbital and inferior dental canals.

To those who are not familiar with this field of work, it may be well to say a word in regard to the character of the lymphatic system. All the cells of the body are bathed in fluid with which, through metabolism, they are in vital reaction. This fluid passes out through the walls of the blood capillaries into intercellular or interfibrous spaces, from which it is collected into minute canals, or spaces, lined by endothelial cells. These are known as the lymph capillaries. From these the fluid passes into larger channels with delicate endothelial walls, and finally into large lymphatic trunks, some of which have walls similar to the veins. The fluid is finally returned to the blood circulation through a valve-guarded opening into the subclavian vein. Along the course of these channels are interposed many lymphatic glands or lymph nodes.

As a general statement, lymphatic vessels are present wherever connective tissue is found. As long ago as 1891, Foster[2] said, "Of all the varied functions of connective tissue perhaps the most important is this relation to the lymphatic system; in nearly every part of the body connective tissue serves as the bed or origin of lymphatic vessels." Failure to inject them cannot be taken as proof that lymphatic vessels do not exist in a given location. Because of their inaccessibility and the structural peculiarities of the tissues, the dental system has long resisted all attempts to demonstrate the presence of lymphatic vessels.

The difficulty of injecting lymph vessels, as compared with blood vessels, can be readily appreciated. In some places large lymph vessels can be found, and because of the rich, plexus-like anastomosis of the small channels, they can be injected backward. In the dental region, however, this is quite impossible because of their minute size and the delicacy of the walls.

In the dental region, the method employed consists in slowly and gently carrying the fluid into intercelluiar and interfibrous spaces and by careful massage, forcing it through the interlacing, plexiform channels. In this way the injecting fluid is made to follow the natural course of drainage of the area, and to a limited extent can be forced backward into the other lymph capillaries. If this is kept in mind, it will be easier to interpret the illustrations.

LYMPHATIC VESSELS OF DENTAL SYSTEM

I will now describe briefly the arrangement of the lymphatic vessels of the dental system as made out by previous workers and as shown in our work.

Sappey[3] describes and beautifully illustrates the lymphatic vessels of the mucous membrane of the mouth, cheeks and lips. He shows a very rich plexus of lymph capillaries in every connective tissue papilla of the mucosa. These are drained into a rich delicate network in the submucosa, passing downward over the buccal and lingual surfaces of the alveolar process, and at the reflection from the bone to the cheek, or the bone to the tongue, forming a wreathlike network. In the lower jaw, this wreathlike network is drained by a few efferent trunks: on the outside, passing from the median portion to a submental lymph node and from the lateral portion to the submaxillary and superficial cervical nodes; on the lingual side, near the median line a few efferent trunks pierce the floor of the mouth and pass to the submental node. At the posterior portion they anastomose with the vessels from the sides of the tongue and the pharynx and pass chiefly to the median nodes of the upper group of deep cervical nodes.

In the upper jaw the wreath lying between the maxilla and the reflection of the cheek is drained by a

* Chairman's address, read before the Section on Stomatology at the Sixty-Ninth Annual Session of the American Medical Association, Chicago, June, 1918.

* Because of lack of space, this article is abbreviated in THE JOURNAL. The complete article appears in the Transactions of the Section and in the author's reprints. A copy of the latter will be sent by the author on receipt of a stamped addressed envelop.

1. Schweitzer: Ueber die Lymphgefässe des Zahnfleisches und der Zähne beim Menschen und bei Säugetieren, Arch. f. mikr. Anat., 1907, **69**, 807; 1909, **74**, 927.

2. Foster, Sir. Michael: A Text-Book of Physiology.

3. Sappey: Anatomie, physiologie, pathologie des vaisseaux lymphatiques considérés chez l'homme et les vertébrés, Paris, 1874.

few efferent vessels, most of which follow the facial vessels and reach the larger submaxillary nodes. On the lingual they run across the hard and soft palate and to the upper nodes of the deep cervical group, usually of the same side but anastomosing and often crossing to those of the opposite side.

Fig. 1.—Unstained section, showing lymph capillaries of the tooth side of the gingivae and their drainage through the ligamentum circulare to the peridental membrane.

Sappey's description is confined, as far as the peridental membrane is concerned, to vessels lying to the occlusal of the ligamentum circulare.

I want now to emphasize the difference in the course of the lymphatic vessels from the papillae of the buccal and lingual slopes of the gingivae, as compared with the course of those from the long, slender papillae of the subgingival space (the side next to the tooth). As Sappey describes, the former do not penetrate the ligamentum circulare but pass down along the periosteum and to the wreathlike network at the reflection of the lip and cheek. The latter penetrate the ligamentum circulare and extend toward the apex of the root in the peridental membrane. Figure 1 shows the lymphatic capillaries of the papillae of the subgingival space, passing among the fibers of the peridental membrane close to the cementum, penetrating the ligamentum circulare and into the larger vessels coursing toward the apex of the root in the peridental membrane.

Figure 1 was drawn with the camera lucida from an unstained section. The results of this injection, as shown by this and other sections and as made out from careful dissection, may be described as follows: The needle was inserted under the periosteum well down on the side of the alveolar process, and the fluid slowly injected, with careful massage during and after injection. It will be seen that a lake was formed on the outside of the process from which the lymphatic vessels have carried the fluid through the spaces of the bone into the vessels of the peridental membrane. These have been filled in both directions, the fluid passing in them, occlusally and toward the apex. Occlusally it has passed through the minute vessels even into the ends of the papillae of the subgingival space. Passing apically, comparatively large vessels can be seen, as well as many small ones. Figures 2 and 3 were drawn from transverse sections of similar injections.

The connective tissue accompanying the blood vessels and nerves is seen to contain many injected lymphatic vessels. These continually anastomose with vessels in the spaces of the bone. At the apex of the root the vessels anastomose with lymphatic vessels which accompany the blood vessels through the foramina in the cementum into the dental pulp. Figure 4, which is cut transversely just at the apex of the root, shows one vessel passing from the pulp to the peridental membrane, and several cut transversely in other foramina. On reaching the pulp chamber, the lymphatic vessels are either perivascular or independent. The material seems to show that most of the larger blood vessels in the central portion of the pulp have perivascular lymph sheaths; but there are also good sized lymphatic vessels lined by endothelial cells independent of blood vessels. The latter seem to be chiefly toward the periphery of the pulp.

Figure 5 was drawn from a thick, unstained section. The injecting fluid has been forced out through lymph vessels into intercellular spaces in the pulp, and seems to be surrounding the odontoblasts. The coloring matter has even been dissolved into the dentinal tubules in some places. From this area small vessels may be seen uniting into a larger vessel. Several of these sections seem to indicate that the intercellular lymph spaces communicate with the dentinal tubules, and in this the experimental evidence corresponds with the clinical experience of discoloration of the dentin by the solution of blood pigments being carried into the dentinal tubules in infarction of the dental pulp.

The lymph vessels from the dental pulp pass through the apical space into the spaces of the bone, anastomosing with the rich lymphatic network in this tissue. The vessels pass to the periosteum, but drain to the inferior dental canal in the lower jaw and the infraorbital canal in the upper jaw. Here they form a rich plexus around the blood vessels and in the sheaths of the nerve trunks. Figures 6 and 7 are photomicrographs of these areas and show these vessels well injected.

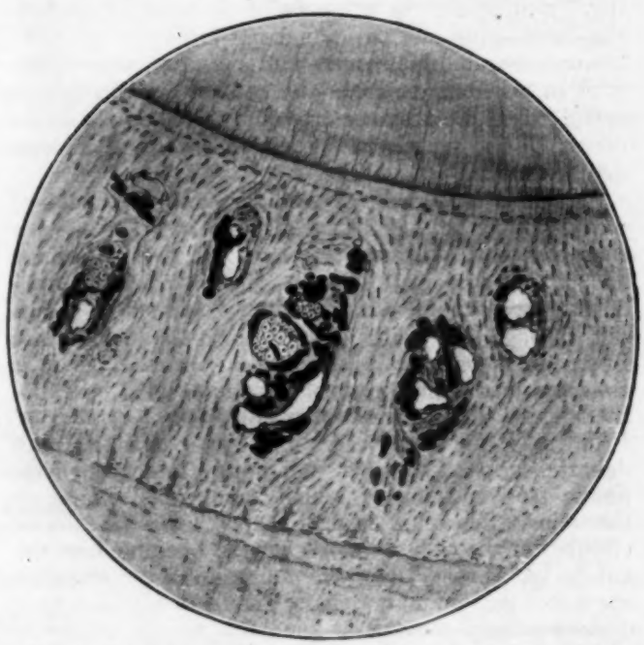

Fig. 3.—Transverse section of the peridental membrane, showing injected lymphatic vessels (oc., 3; obj., 16 mm.; reduced about one tenth).

The vessels pass out of the mental and infraorbital foramina, pass in a superficial course, and fol-

low the facial artery and vein passing to the large submaxillary lymph nodes. Figures 8 and 9 are drawings of a head in which the vessels could be followed all the way from these foramina to the glands. In this head the only injections were into the pulps of the canines and first molars. Microscopic sections of the

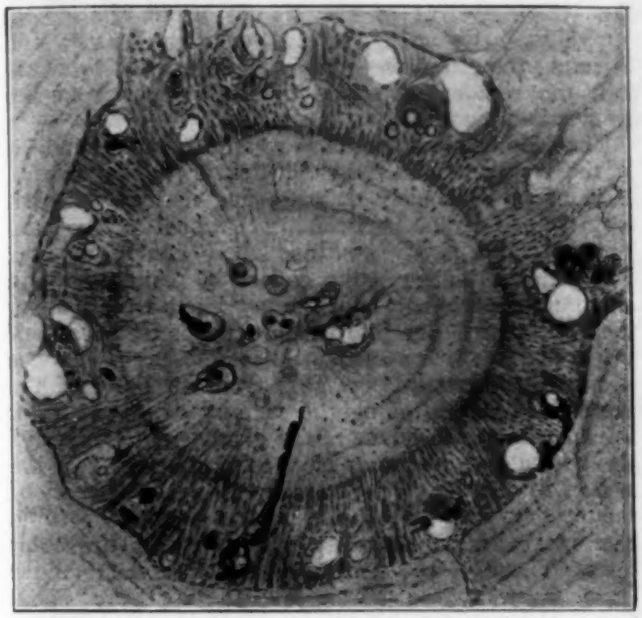

Fig. 4.—Transverse section just at the apex of the root, showing injected lymphatic vessels in the peridental membrane and in the canals passing to the pulp (oc., 2; obj., 16 mm.; reduced about one third).

glands from similar specimens showed the injecting material to be in the lymph spaces of the glands.

Our work supplements that of Schweitzer in two important ways: first, in showing the injection of the lymphatic vessels in the inferior dental and infra-orbital canals, and so showing the complete course of drainage to the submaxillary nodes; and second, in showing the same course by injections only into the pulps of the teeth.

Subperiosteal injection of the lymphatics is especially interesting in reference to infiltration anesthesia, and the course of lymphatic drainage from the papillae of the subgingival spaces is especially important with reference to the progress of destructive inflammation of the peridental membrane.

REVIEW OF LITERATURE AND TECHNIC

The only report in literature of successful injection of the lymphatic vessels of the peridental membrane is one by Schweitzer,[1] who was also the first to demonstrate the presence of lymph vessels in the dental pulp. Other references about lymph vessels in the peridental membrane are limited to mere suggestions and the assumption that they may exist. Ebner[4] describes as structures belonging to the lymph system reticular meshes filled with lymphoid cells, which may be found embedded within the dense fibrous tissue about the teeth. Black[5] referred to nests of nucleated cells in the peridental membrane near the cementum as "lymphatic" glands. In later publications he modified this view to the effect that these cell collections may be glandular structures. Dorendorf,[6] who made a study of the lymphatic circulation of the lip with reference to the spread of carcinoma, extended his experiments to injections of the lymph vessels of the gingiva and the periosteum, but only brief protocols of the results of the injections are given, because, as he states himself, complete specimens could not be obtained.

The lymphatics of the gingiva are better known. Sappey[7] gives a clear picture of the arrangement of the lymph system in the gingiva and the palate, but fails to refer to any lymph vessels in the peridental membrane, while he mentions unsuccesssful attempts to demonstrate lymph vessels in the dental pulp and does not hesitate, in spite of failures, to express his belief that they may exist.

The older method of injecting lymph vessels with mercury which has yielded excellent results in such skilful hands as Sappey's, has been largely superseded by methods employing less heavy injection masses, and it is most likely due to the greater power of penetration of the more fluid masses that lymph vessels could be demonstrated which failed by mercury injection methods. The mass in most common use now is the so-called Gerota mass, Prussian blue or Berlin blue in the oil color, dissolved in turpentine oil and sulphuric ether. With this mass and a method known as the Gerota method, Schweitzer was able to inject successfully the lymph system of the peridental membrane and to a less complete degree lymph vessels of the dental pulp. The general picture of the lymphatic arrangement in the peridental membrane, as Schweitzer expresses it, is that of a funnel extending from the deepest layers of the gingiva down into the alveolus. The walls of this funnel lying in the peridental membrane consist of a dense network of lymph capillaries in several layers, anastomosing with one another. The main trunks, which arise from this network and which are larger than the blood vessels, run in

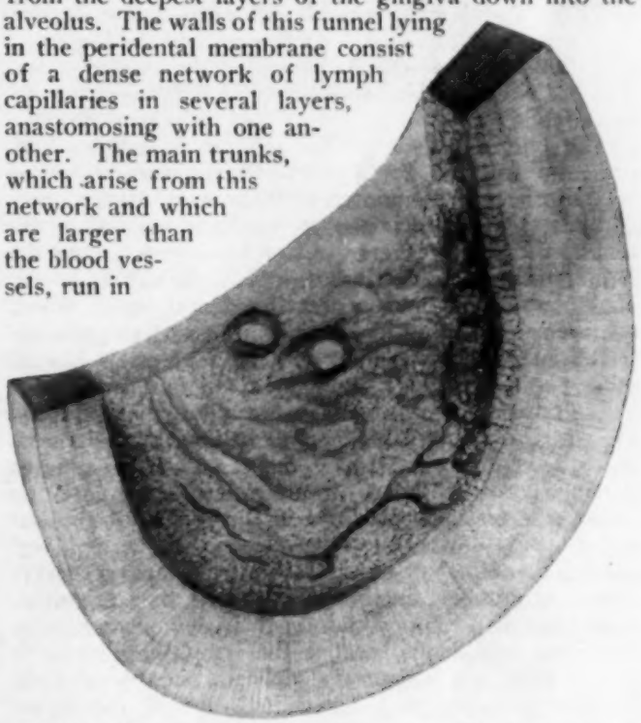

Fig. 5.—Diagrammatic drawing of a section of a tooth, showing injected lymphatic vessels in the pulp.

a direction longitudinal to the axis of the tooth. They communicate with one another by numerous anastomoses. At the level of the ligamentum circulare,

4. Ebner: Weichgebilde der Zähne, Scheff's Handbuch der Zahnheilkunde, Vienna and Leipzig, 1909, **1**, 269.
5. Black: A Study of the Histological Character of the Periosteum and Peridental Membrane, 1887.
6. Dorendorf: Ueber die Lymphgefässe und Lymphdrüsen der Lippe mit Beziehung auf die Verbreitung des Unterlippencarcinoms, Internat. Monatschr. f. Anat. u. Phys., 1900, **17**, 201.
7. Sappey (Footnote 3), p. 69.

lymph vessels are present in several rows which surround the tooth like a wreath. The vessels ascending from this assume the form of lacunae and round masses, which in sections have the appearance of bunches of grapes. Numerous anastomoses connect the lymph vessels of the peridental membrane, first,

Fig. 6.—Photomicrograph, showing injection of perivascular and perineural lymph spaces in the vessels of the inferior dental canal.

with the neighboring larger lymph vessels passing through the bone; secondly, at the inlet of the alveolus with the deep lymphatic network of the gingival submucosa, and thirdly, at the apex of the root with the lymph vessels accompanying the larger blood vessels entering and leaving the dental pulp and therefore also with the lymph paths of this organ. In the lower jaw they communicate also with the lymph vessels which follow the blood vessels and nerves within the mandibular canal.

The lymph vessels of the gingiva have been successfully injected by several investigators. Sappey was the first to demonstrate them, and the accuracy of his statements has been, in the main, verified by the results of later workers. After having described the lymphatic apparatus of the gingiva, he expresses the view that one should expect the dental bulbs, which are actually nothing else than papillae of the mucous membrane, to be provided with lymph vessels like all other papillae of the integuments. In fact, in spite of his failures to inject them, in the adult, the child and the fetus, he is still inclined to believe in their existence. According to Sappey, the vessels of the gingiva passing between the teeth unite into one vessel on either side on each jaw, and in the region of the last molar pass down into the deeper tissue. Most[8] admits the efferent vessels apparently are relatively scanty in number, but he believes that they are more numerous than Sappey claims; their demonstration by injections is difficult because the lymph capillaries in this region are extremely delicate, conforming to Teichmann's law that (so-called) lymph capillaries decrease in size and width the more delicate the mucosa is and the more the latter adheres to the subjacent tissue. Most was generally able to inject one, two and three trunks.

An interesting exception to another general principle laid down by Teichmann, known as Teichmann's rule, has been observed by Schweitzer to occur exclusively in the gingiva. According to this rule, the last terminals of the lymphatic apparatus always lie deeper, that is, more centrally than the blood capillary network. In the gingivae we find the reversed condition. Schweitzer admits that he is unable to explain the purpose of this exceptional arrangement. This investigator has made the most extensive practical study of the lymph system of the tissues about the dental apparatus. By using several coloring masses for injecting the different portions, he attempted to ascertain the regional drainage of the lymph from the gingiva and the teeth.

The following is a summary which Bartels[9] has given of the results obtained by Schweitzer: The gingiva contains an extremely delicate, fine meshed network from which lymph vessels arise, which partly pass outward, and partly continue their course inward. The outer drainage paths collect in plexuses which surround the two halves of the jaw like a wreath along the upper and lower fold of the mucous membrane of the cheek, and form median anastomoses. From the plexuses numerous twigs pass from all parts of the alveolar processes along the vicinity of the anterior fascial vein to all submaxillary glands. In rare cases also the submental glands have been injected from the region of the four lower incisors (one case each of Schweitzer, Dorendorf and Polya and Navratil[10]). The inner drainage pathways originate as the outer ones. Those of the upper jaw differ in their course from those of the lower jaw. The former pass through the mucosa of the hard palate and from the lateral end of the alveolar processes over the soft palate and the pharyngeal wall downward and enter directly into the deep cervical glands. Generally they empty into the glands of the same side, but not rarely they cross and pass into the corresponding glands of

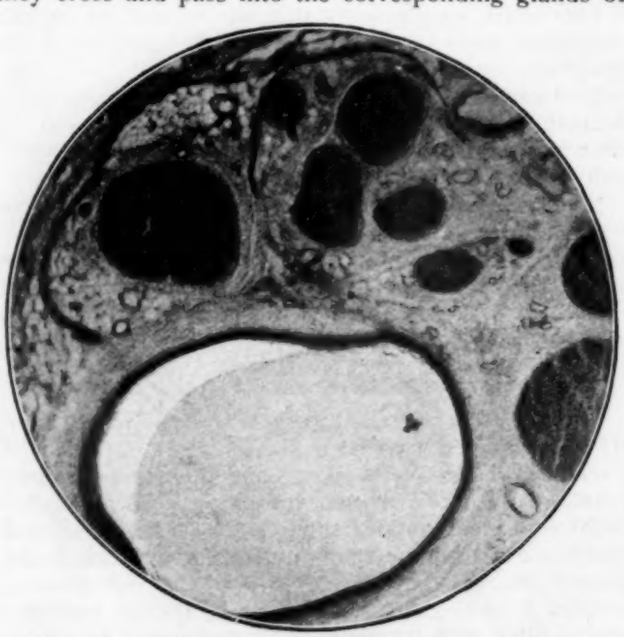

Fig. 7.—Photomicrograph, showing injected perineural lymphatics in the infra-orbital canal.

the opposite side. The inner drainage pathways of the mandibular gingiva pass from the region of the incisors along the lingual surface of the jaw through

8. Most: Die Topographie des Lymphgefässapparates des Kopfes und des Halses, in ihrer Bedeutung für die Chirurgie, Berlin, 1906, p. 98.

9. Bartels: Bardeleben's Handbuch der Anatomie des Menschen, 1909, **3**, Part 4, Das Lymphgefässsystem.

10. Polya and Navratil: Untersuchungen über die Lymphbahnen der Wangenschleimhaut, Ztschr. f. Chir., 1903, **66**, 122.

the mylohyoid muscle to the anterior submaxillary gland, and from all regions along the transitional fold to the deep cervical glands.

As to the pathways draining the teeth, Schweitzer admits that he has not reached complete and final issues; some conclusions are still represented as "probabilities." He says:

> As lymph paths from the teeth of the upper jaw, at least for part of them, we may consider as very probable, lymph vessels which emerge from the infra-orbital foramen or smaller secondary openings to the outer surface of the maxilla and pass to the submaxillary glands (media and posterior). In the lower jaw the lymph flows through rami dentales into lymph paths which course within the mandibular canal. Although it has hitherto not been possible to follow the latter vessels to their terminal passage into a lymph gland, we may assume, from analogy of the inner drainage of the gingiva, that they empty into the deep cervical glands or in part to the submaxillary glands.

As we shall show later, we can verify the correctness of this supposition; we have succeeded in injecting these lymph vessels in their entire passage from their exit at the infra-orbital and the mental foramen to their entrance into the submaxillary glands (Fig. 8).

The accompanying table is one set up by Schweitzer, which shows the drainage of the different regions of the gingiva, demonstrated chiefly by the results of injections with differently colored injection masses. Although he warns that separation of the glands according to regional sources be made only with some caution, because of the possibilities of the anastomoses, he assures that clinical experience is entirely in accord with his experimental evidences. Of particular interest are the extensive statistical observations of Partsch[11] and Ollendorf[12] about the swelling of lymph glands in morbid conditions.

This picture of the lymph system of the gingiva, the peridental membrane and the dental pulp will be more complete if it is seen in its relation to the blood supply. Wedl[13] was the first to demonstrate and accurately describe the location, general arrangement and course of the blood vessels in this region. Schweitzer has added some interesting features, especially about the vessels of the dental pulp. At the apex, between the dense fibers, we find a loose connective tissue which surrounds the larger vessels and nerves. Such loose interstitial connective tissue also fills the spaces between the bundles of fibers of the peridental membrane, in which course the numerous blood vessels which ascend from the depth of the alveoli toward the gingiva. These vessels communicate with the vessels of the pulp, with those of the medullary spaces of the alveolar wall and with the vessels of the gingiva. Near the surface of the tooth there are long capillary loops; these become narrower toward the apex of the tooth and the neck of the tooth. The arrangement of the capillaries in the peridental membrane is quite unique. Both Wedl and Schweitzer describe peculiar round tufts of loops which Wedl was the first to compare with the glomeruli of the kidney, a resemblance which Schweitzer emphasizes in his illustrations, in which an actual connective tissue capsule around these tufts can be distinctly seen. Besides these singular formations there are capillary loops "en palissade." The peculiarity of this vascular arrangement is explained as a conformation due to unusual functional demands on a tissue of such structural and physiologic significance as is the case of the peridental membrane.

REGIONAL DRAINAGE OF LYMPH VESSELS (OUTER LYMPH PATHS)

From the Region of:	Upper Jaw into Submaxillary Lymph Glands			Lower Jaw into Submaxillary Glands		
	Anterior	Median	Posterior	Anterior	Median	Posterior
Incisors and canines	Only exceptionally one vessel	About 5/6	Almost 1/6	About 1/3	About 1/3	Occasionally
Premolars	0	About 2/3	About 1/3	Rarely one vessel	Almost all	0
Molars	0	Almost 1/2	A little more than 1/2	Occasionally one vessel	Almost all	Occasionally one vessel

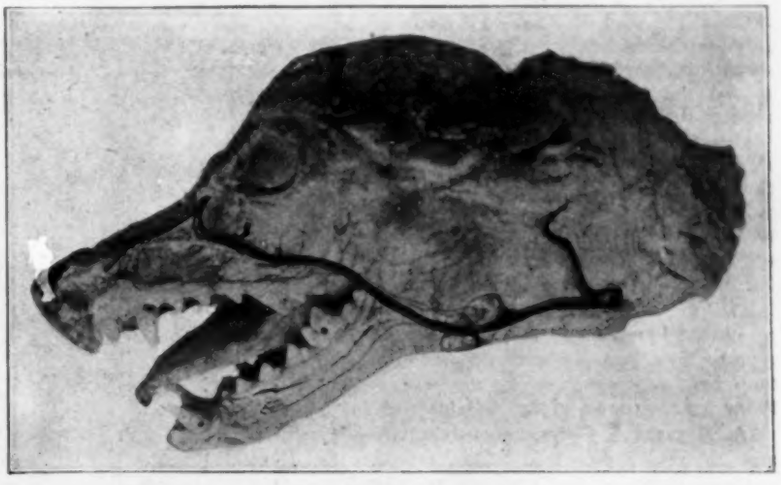

Fig. 9.—Drawing of dog's head showing injected lymph vessels from the infra-orbital and mental foramina to the submaxillary lymph nodes.

As to the dental pulp, Schweitzer insists that the number of vessels is greater than is usually given. The arteries entering the pulp divide into several parallel branches, which run toward the coronal extremity, giving off lateral branches mostly at right angles. These minute twigs form a precapillary network from which a very fine capillary network arises, located at the surface of the pulp between the odontoblasts. There are analogous venous networks; the veins leaving the pulp chamber are larger in number than the arteries. Being compressed at the apical foramen, the vessels in passing out spread out in rays, or fan-like. Even when still within the pulp cavity at the foramen where there is only cementum, divisions of the pulp vessels may branch off at obtuse or right angles, and pass through the cementum to gain the peridental membrane. De Saran[14] asserts that he has seen this very frequently.

11. Partsch: Erkrankungen der Zähne und Lymphdrüsen, Odontologische Blätter, 1899; Ein Beitrag zur Klinik der Zahnkrankheiten, Oesterr. Ztschr. f. Stomat., 1903. Die Zähne als Eingangspforte der Tuberculose, Deutsch. med. Wchnschr., 1904, **30**, 1428.

12. Ollendorf: Ueber den Zusammenhang der Schwellungen der regionären Lymphdrüsen zu den Erkrankungen der Zähne, Ztschr. f. Zahnheilkunde, 1898.

13. Wedl: Pathologie der Zähne, 1870, p. 37. (The later record by Metnitz and Wunschheim, Leipzig, 1901, **1**, is not accessible.)

14. De Saran: Vaisseaux sanguins des racines dentaires, Gaz. méd. de Paris, 1880, No. 48, p. 736.

In previously published work[15] we reported that we have indisputably demontrated that the lymph vessels of the dental pulp can be injected, not only in a retrograde direction by way of the gingiva, as Schweitzer did, but also by forcing the injection mass through the tooth directly into the exposed pulp tissue. The first investigation was limited to a study of the lymph supply of the pulp. The purpose of the present work was to follow the course of the outflowing vessels, to examine the extent of their communications with neighboring tissues, and to study their course in the mandibular and infra-orbital canals: in short, to fill out some gaps left in Schweitzer's results.

ABSTRACT OF DISCUSSION

Dr. Eugene S. Talbot, Chicago: Twelve years ago Dr. Latham and I did some work on dental pulp, but not in relation to the lymph channels. We were astonished at that time because of the large number of abscesses that form in the dental pulp. It is almost impossible to believe that abscesses form in the dental pulp without causing any pain, and later heal up, which naturally would show that there must be lymphatics connected with the dental pulp. It was not until Dr. Rosenow showed how the streptococcus travels through the blood stream into different parts of the body that it was fully explained how these germs pass through the ends of the roots into the dental pulp and form abscesses. We have on record one case, which was a wonderful illustration of the abscess theory. This pulp shows an abscess forming, another one healing and one practically ripe with the pus inside of it, showing the different changes that had taken place from the time of infection to the healing of the abscess in the dental pulp. If one makes a study of the dental pulp with a view to looking into this abscess formation, he will find a great many scars in the dental pulp where abscesses have formed and healed.

Dr. Edward H. Hatton, Chicago: These pathologic changes which are found about the gingivae and in the regions adjacent to these pus pockets can be explained in no other way than by the presence of lymphatics in the peridental membrane leading down along the teeth and into the pulp cavity.

Dr. Herbert A. Potts, Chicago: Aside from the histologic and anatomic interest of these studies, the demonstration explains many of our brilliant successes and many of our failures in the induction of local anesthesia. Two years ago Dr. Noyes told us the difficulty by which these injections were attended. I am sure that most of my success is due to the technic of the injection itself. Only by slow, steady injection do you obtain results.

Dr. Frederick B. Noyes, Chicago: I think you will find that this work has a bearing not only on local anesthesia but on the whole realm of dental pathology, especially the destructive inflammations which have their origin in the gingival spaces.

15. Noyes, F. B., and Dewey, K. W.: A Study of the Lymphatic Vessels of the Dental pulp, Dental Cosmos, 1917, **59**, 436.

Reeducation of French War Cripples.—It was recently estimated that France had 300,000 disabled soldiers, with a monthly increase of between 6,000 and 7,000. They are cared for in national centers of physiotherapy, of which there is one for each of France's twenty military regions. To these centers are attached schools or workshops which the cripples may attend for purposes of reeducation. Independent of the centers, there are also civil schools for vocational reeducation, supported by both public and private funds; and finally there is the National Institute near Paris under the joint direction of the Ministries of War and of the Interior, with a well equipped military hospital, together with workshops and dormitories. Almost universally the "boarding-in" system prevails, that is, the soldier lives at the school and is under its direct discipline during his period of training.

FURTHER EXPERIMENTAL STUDY OF SURGICAL SHOCK*

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A review of the results obtained in the extensive amount of work that has been done on the problem of shock, both experimentally and clinically, makes the point I have repeatedly emphasized particularly clear, namely, that the condition the surgeon calls shock may be due to a variety of causes.[1] The variation in the primary etiologic factor in a condition in which identical clinical symptoms occur is probably the cause of the more or less contradictory conclusions arrived at by investigators, both experimentally and clinically.

The value of experimental work on surgical shock is certainly decreased by the fact that it is impossible to reproduce the experimental environment, and the condition itself, in a manner identical to its clinical manifestation. From the results of a large series of experiments I am forced to conclude that the experimental investigator approaches, in only a few specific types, the condition that the surgeon studies clinically.

The future work on the subject termed shock will, in all probability, not concern itself with the condition as an entity, but with the different possible etiologic factors that could produce the clinical picture the surgeon has in mind. Two excellent examples of this form of research on the problem have recently been presented. They are the relation of fat emboli to conditions diagnosed as surgical shock, as shown by Bissell[2] and by Porter,[3] and wound shock of Cannon[4] and his coworkers. While in neither case have all the factors involved been explained, the positive fact that cases which the surgeon diagnoses as shock may be classified is of the greatest importance.

There is, I believe, one general statement that can be made to include all cases clinically diagnosed as shock, namely, that the fundamental cause of death in each instance is a failure of physiologic compensation. From the therapeutic standpoint one of the most important problems to solve in connection with shock is to determine why some persons fail to compensate for the various procedures to which they are submitted.

I have discussed in a previous paper[5] the effect of the anesthetic in relation to shock, but the anesthetic is of so much importance, both in experimental and in postoperative shock, that its effect should be emphasized. Recently, while performing some experiments, I found that a low blood pressure was produced invariably within an hour or two after the beginning of anesthesia, regardless of the experimental procedures employed. These results were proved to be due to impure ether. Careful experiments in anesthetic control should always be performed before it is con-

* From the Mayo Clinic.

* Read before the Section on Pathology and Physiology at the Sixty-Ninth Annual Session of the American Medical Association, Chicago, June, 1918

1. Mann, F. C.: The Peripheral Origin of Surgical Shock, Bull. Johns Hopkins Hosp., 1914, **25**, 205-212.
2. Bissell, W. W.: Pulmonary Fat Embolism—A Frequent Cause of Postoperative Surgical Shock, Surg., Gynec. and Obst., 1917, **25**, 8-22.
3. Porter, W. T.: Shock at the Front, Boston Med. and Surg. Jour., 1916, **175**, 854-858.
4. Cannon, W. B.: A Consideration of the Nature of Wound Shock, The Journal A. M. A., March 2, 1918, pp. 611-617.
5. Mann, F. C.: Shock During General Anesthesia, The Journal A. M. A., Aug. 4, 1917, pp. 371-374.

cluded that an experimental procedure produces the symptoms of shock.

THE RELATION OF THE NERVOUS SYSTEM TO SHOCK

The relation of the nervous system, as a primary agent, to the condition which the surgeon diagnoses as shock is not clear. It is quite probable that the nervous system is a primary etiologic factor in some cases, particularly in those in which an anesthetic has not been employed. There are no experimental data extant in which such a relationship has been proved beyond a doubt. The results of numerous experiments that I have performed under light ether anesthesia have been, with the few exceptions previously recorded, uniformly negative. It certainly is possible to stimulate, either electrically or mechanically, one or all of the major nerves going to the limbs, for example, the sciatic and brachial plexus of a dog under constant surgical ether anesthesia, for as long as four hours, without producing the condition of shock. It should be emphasized that the marked fluctuation in respiration and blood pressure that occurs following such stimulation is not shock, and shock can be said to have occurred only when the cardinal signs of the condition are present at the end of the period of stimulation. In my experiments this has not occurred, but both respiration and blood pressure have quicky returned to approximately the normal condition. The same phenomenon follows section of the major nerves. Whether or not much reaction follows such a procedure depends mainly on the depth of the anesthesia. Under light anesthesia, section of the sciatic nerves and the brachial plexus produces marked changes in respiration and blood pressure; when deep anesthesia is employed, section of these nerves may produce only the slightest response in respiration or blood pressure. In either case shock does not follow section of the nerves. We have observed animals which, under light anesthesia, have had a normal blood pressure eight hours after section of the major nerves to each limb (Fig. 1). I am inclined to believe that, in most instances in which the primary factor is the nervous system, the cause will be found to be of the nature of inhibition, as held by Meltzer.[6]

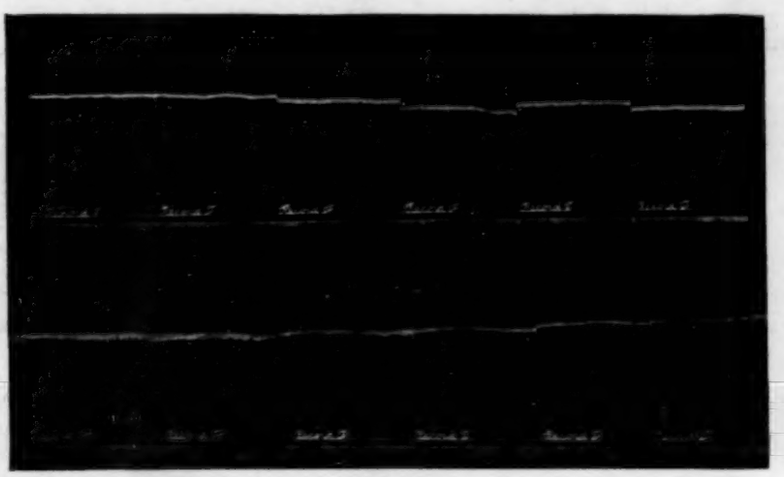

Fig. 1.—Kymograph record illustrating (1) an anesthetic control experiment and (2) the effect of section of the major nerves to each limb; Record I, normal blood pressure (140); Record II, immediately after exposing the sciatics and brachial plexuses; Record III, immediately after section of both sciatics and brachial plexuses. Each succeeding record was taken at intervals of an hour; thus, Record XII was taken nine hours after section of the nerves, and the blood pressure was 145.

Under only two conditions have I been able to produce death by nerve stimulation. One condition was produced by stimulating the nerve fibers that inhibited respiration when the animal was under deep anesthesia. Ether anesthesia seems to depress, and, when the tension is great enough, abolishes all respiratory reflexes except one before respiration ceases. The reflex that it does not abolish before the respiratory center fails is the one that inhibits respiration. Instead of ether depressing this reflex, it is quite common for its action to be increased. Under deep etherization it is possible, in many instances, actually to kill the animal by prolonged stimulation of nerve fibers that inhibit respiration. The stimulation of some nerves, as the central end of the vagus and the superior laryngeal, usually inhibits respiration for a short period. As the stimulation is continued, however, respiratory movements soon return, owing either to a decrease in the reflex or, what is more probable, to an increase in the chemical stimulation of the nerve center. It is rarely possible, under light surgical anesthesia, to inhibit respiration by the stimulation of these nerves for a long enough period to jeopardize the life of an animal. As the ether tension is increased, the length of time the respiratory movements are inhibited is prolonged. Finally, in a large number of cases, under deep etherization, respiration fails to return, and blood pressure quickly falls, death ensuing. In other cases, while respiration is always inhibited for a time, recovery occurs. In the earlier experiments the blood pressure was usually decreased, as much as one-half the normal pressure, before respiration could be inhibited long enough to produce death. However, it was found that by cautiously increasing the ether tension, many animals could be killed while the blood pressure was practically normal. The method of administering the anesthetic does not seem to be a factor in producing death. In most of our experiments the Connell[7] apparatus was used, in some instances a modification of McGrath's[8] method, while in still others only the cone method was used. While it is possible that death in these cases may be due to factors other than the inhibition of respiration and asphyxia, there is no evidence to show it. I have never been able to obtain this result by stimulating nerves that did not inhibit respiration. Death will not occur while insufflation or artificial respiration is maintained, if the ether tension is not above that compatible with life. Death under deep etherization has not been produced except in connection with inhibition of respiration. The process producing death in such experiments seems to be as follows:

For some unknown reason, ether does not abolish reflexes that inhibit respiration as long as the respiratory center responds. Under deep etherization the threshold of the cells of the respiratory center is

6. Meltzer, S. J.: The Nature of Shock, Arch. Int. Med., July, 1908, pp. 571-588.

7. Connell, K.: An Apparatus—Anaesthetometer—for Measuring and Mixing Anesthetic and Other Vapors and Gases, Surg., Gynec. and Obst., 1913, **16**, 245-255.

8. McGrath, B. F.: Anesthesia in Surgical Research, Surg., Gynec. and Obst., 1914, **18**, 376-377.

greatly increased to the chemical stimuli. A point is thus reached at which the center will respond to the inhibitory reflex, and not to the increased carbon dioxid in the blood. At this time the stimulation of inhibitory fibers will produce death, and, owing to the deep etherization, quite quickly in many instances. Attempts have been made to produce the same result by both methods of stimulating the nerves other than by electricity or deep etherization. To date, however, all attempts have failed (Fig. 2).

It has been thought for a long time that inhibition of the heart, due to stimulation of the vagus, might produce death in mammals, and it has also been suggested that a reflex producing inhibition of the heart might also end fatally. In a few instances in this series of experiments such a result seems to have been produced. However, to the present time, death, owing to apparent reflex inhibition of the heart, has not been produced by stimulation of any nerve except the superior laryngeal, although it would seem that the central end of one vagus with the other intact would be effective. As this reflex disappears under deep etherization, it appears that death could occur only by reflex inhibition of the heart under light anesthesia. Such was the case in these experiments (Fig. 3).

What practical bearing such experiments have on the shock problem cannot at present be stated. Death is produced so suddenly and so strikingly under these conditions that it seems highly probable the same thing has occurred in man. It is quite possible that deep etherization and inhibition of respiration during the time in which operations are being performed in the region of the neck, axilla and diaphragm (regions in which traumatic procedures are prone to produce stoppage of respiration) are responsible for some of the sudden deaths on the operating table that the surgeon has diagnosed as due to shock.

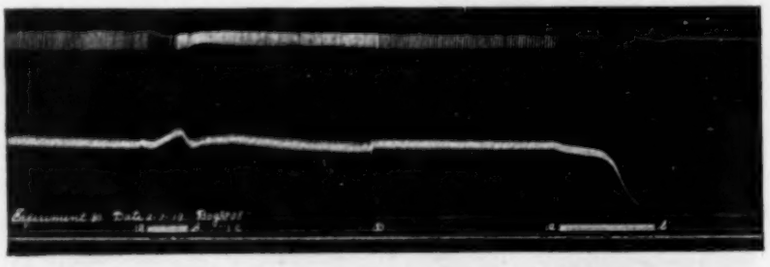

Fig. 2.—Kymograph record showing the effect of stimulating the central end of the vagus under light and deep anesthesia. Normal blood pressure was 115. At signal *a*, ether was disconnected and the control end of the left vagus was stimulated at *b* until respiratory movements returned. During the interval *D* (sixteen minutes) ether tension was increased. At *a* the ether was discontinued, and at *b* the vagus was again stimulated, and death occurred.

THE RELATION OF FLUID VOLUME TO SHOCK

The conception that in most of the cases which the surgeon diagnoses as shock the patients are in a pathologicophysiologic state, in which the cause of the symptoms is a loss of circulatory fluid, has been adversely criticized, because of the clinical distinction that is made between hemorrhage and shock. This has been due, I believe, to a failure to consider the fundamental likenesses and differences between the two conditions.[9] The symptoms of this form of shock and of hemorrhage are, in the main, due to the loss of circulatory fluid. In general, after hemorrhage, the vascular system is capable of functioning, and the mechanism controlling fluid volume is able to at least partially compensate for the loss. In the condition of shock, however, not only is there a loss of circulatory fluid, but the mechanism which controls fluid volume is also, and possibly primarily, greatly impaired. That is the reason why, in the former condition, intravenous injection of salt solution is of distinct value, while even the so-called colloidal solutions do not remain long in the circulation in the latter condition.

Janeway and Jackson[10] have shown that a circulatory failure, which presents the typical signs of shock, may be produced in dogs by a partial occlusion of the inferior vena cava at its point of entrance into the thorax. This has been corroborated by other investigators.[11] It seems that, for the most part, the result is due to the effect of the occlusion on the portal circulation and the liver, because it is well known that ligation of the inferior cava at a point just below the entrance of the hepatic veins is a perfectly safe surgical procedure in most dogs. The collateral venous return is such that a ligature thus applied does not produce any of the symptoms of shock. The ligation of the portal vein will always cause death in a few hours. Even partial occlusion of this vein, as sometimes occurs in a badly made Eck fistula, will produce death in a couple of days.

In a recent series of experiments, I have attempted to determine the relation of the volume of capillary and venous beds to the signs of shock. Only a brief preliminary report can be made of these experiments.

The method consisted in including in a strong ligature all the structures to each limb except the major artery. In this manner the major artery was allowed to pump blood into the limb, from which all venous and lymph return was obstructed. The results of a sufficiently large series of experiments are in general agreement. The first effect of such a procedure is a slight and ordinarily transient rise in blood pressure. The blood pressure, as a rule, soon decreases and at the end of two hours it has only about half its initial value. At this time the animal generally exhibits the signs of shock. If the ligatures are then removed, recovery usually takes place. When the ligatures are left on for a long period of time, there may be an initial rise in pressure following their removal, but it subsequently decreases. When the ligatures have been applied for a very long period, the removal produces a further drop in blood pressure, and eventually, death. To a lesser degree these results may be obtained when only three limbs are used. From the results of such experiments it would seem that a condition producing stasis in a large capillary field would produce the signs of shock. It should be emphasized that simple vasomotor dilatation will not cause this condition. Section of the nerve supply to all the limbs does not produce the signs of shock (Fig. 1).

THE TREATMENT OF SHOCK

The treatment of shock may be divided into: (1) general measures, (2) the use of drugs, (3) attempts

9. Mann, F. C.: Shock and Hemorrhage: An Experimental Study, Surg., Gynec. and Obst., 1915, **21**, 430-441.

10. Janeway, H. H., and Jackson, H. C.: The Distribution of Blood in Shock, Proc. Soc. Exper. Biol. and Med., 1914-1915, **12**, 193-197.

11. Erlanger, Joseph; Gessell, Robert, and Gasser, H. S.: An Experimental Study of Surgical Shock, The Journal A. M. A., Dec. 22, 1917, pp. 2089-2092.

to restore the fluid volume, and (4) special measures. In studying any form of treatment of shock experimentally, it is necessary carefully to standardize the experimental procedures. In this series of investigations the routine method of experimentation was as follows:

The animal (dog) was etherized in a closed cabinet, intubated, and a constant surgical anesthesia maintained by means of the Connell apparatus. The carotid blood pressure was recorded with a mercury manometer. Marked changes in the temperature were prevented by the judicious use of an electric pad. After a normal record had been obtained, the abdominal viscera were exposed and gently sponged, about every fifteen minutes, with dry gauze. When the blood pressure had decreased and remained rather stationary at the desired point, which occurred usually from about one to two hours after exposure of the viscera, the viscera were returned to the abdominal cavity and the wound was repaired. After waiting a sufficient length of time to determine definitely that the blood pressure did not increase, the procedure designated to improve the condition of the animal was instituted. The blood pressure was taken as a criterion of the condition of the animal because it is the easiest indication to record and compare. It should be emphasized that the anesthetic was constant throughout the experiment. This removes the possibility of the ether producing an error in either the interpretation of the blood pressure record or the general condition of the animal. Careful anesthetic control experiments were performed, the etherization being maintained at the same tension and for a length of time equal to the shock experiment. It should be noted that practical conclusions can be drawn only from the results obtained as applying to a condition in which the signs of shock were produced by exposure of the abdominal viscera. If the blood pressure is allowed to decrease until it is much less than half the normal pressure, it is rarely possible to restore it by any known method. This is an important point to consider in placing a value on any method of treatment.

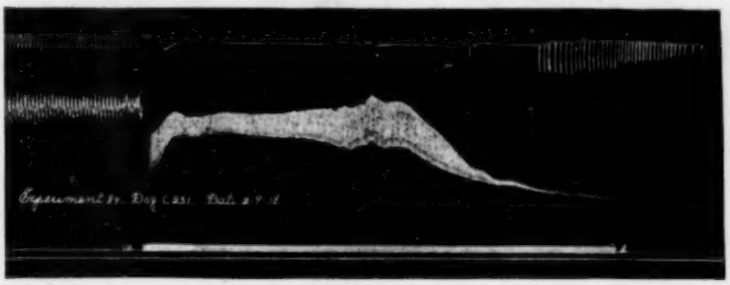

Fig. 3.—Kymograph record showing the effect of stimulating the superior laryngeal nerves under light anesthesia. At *a* ether was disconnected and signal *b* marks the period of stimulation of the superior laryngeal nerve, death occurring. This record is difficult to interpret, but it would appear that inhibition of the heart was the major factor producing death.

The general measures employed consisted of placing the animal in the head-down position, and the application of heat, etc. A slight amount of benefit has been obtained by such methods in experimental shock. In fact, it was found to be of distinct value to keep a heating pad under the animal throughout the experiment, care being taken to apply only a moderate amount of heat.

Drugs are employed for one or two purposes, either as a stimulant to the circulatory system, as strychnin and camphorated oil, or to produce vasomotor constriction, as epinephrin or pituitary extract. The results of the experiments corroborate our previous investigation on the use of stimulants in experimental shock. In none of the experiments was any benefit derived.

The value of the use of vasoconstrictors in the treatment of shock is still an open question. In the first place, although the decrease in blood pressure is of great importance in shock, it is not known whether or not its increase by means of vasomotor constriction is in itself of much permanent benefit to the organism. In the second place, none of the vasomotor constrictor drugs produce a very prolonged effect. In experimental shock it is not possible to maintain blood pressure for a very long period of time near to the normal value by the use of the vasoconstrictor drugs. In our experience pituitary extract produced a more prolonged action, and seemed to be of somewhat greater benefit than epinephrin.

A large number of artificial fluids have been devised with which to attempt to restore the volume of fluid in shock. Our series does not yet include experiments from which positive conclusions may be drawn in regard to all of these. However, they have furnished enough data to justify some tentative conclusions in regard to their use in experimental shock.

1. Physiologic sodium chlorid solution is the least valuable of all the artificial fluids, although hypertonic sodium chlorid solutions are of value.

2. The making of the artificial fluid alkaline definitely enhances its value.

3. The use of glucose in the injected solution is also of definite value.

4. None of the saline solutions alone will maintain blood pressure for more than a very short period of time, even when it has been lowered to but a slight degree by exposure of the abdominal viscera.

5. The employment of the so-called colloidal solutions, such as those containing acacia or gelatin, is of distinct value. The intravenous injection of these fluids will often restore and maintain the blood pressure for several hours after it has been decreased to at least one-half its normal value by the exposure of the abdominal viscera.

6. From these results it would seem that the ideal artificial fluid should contain (*a*) some substance to increase its colloidal properties, (*b*) an alkaline salt, and (*c*) glucose.

7. It should be noted that none of the artificial fluids will give as good results as whole blood or blood serum.

The value of transfusion in the treatment of shock is well known. In this series of experiments, citrated blood produced very good results. In order, however, approximately to restore blood pressure and maintain it, the amount transfused must be comparatively large. About 30 c.c. per kilogram produced the best experimental results. Such an injection will restore and maintain blood pressure under the experimental conditions outlined herein.

Blood serum seems never to have been used in the treatment of shock. In our experiments the intravenous injection of homologous serum has produced as good results, and, in most experiments, better

results, than any of the methods employed in the treatment of experimental shock. In none of the experiments in which the blood pressure had not decreased below one half of its original volume did the injection of serum fail to restore and maintain it for several hours. The best results were obtained by relatively large doses, 20 c.c. per kilogram. The serum was prepared by bleeding healthy dogs into sterile bottles which were placed on ice until it was desired to use the serum. From 35 to 40 per cent. of serum can be obtained in the dog in this manner from whole blood.

When blood serum, 20 c.c. per kilogram, is injected into the animal in which blood pressure has been decreased one-half, as the result of exposure of the abdominal viscera, it produces the usual rise in blood pressure and an increase in the amplitude of the heart, which occurs whenever an intravenous injection is made. However, the increase in blood pressure is usually greater, although it may take place more slowly, than when any of the other injection fluids are used, with the exception of whole blood when used in amounts equal to the amount of blood from which the serum was obtained. The blood pressure seldom decreases subsequently, or only to a slight extent, and usually, with the passage of hours, it increases until it may be greater than at the beginning of the experiment. I have not been able to obtain equally good results by any other method, except by the use of large amounts of whole blood.

Whether or not the use of serum will ever prove of any practical value, I do not know. The employment of large amounts of serum other than homologous serum would probably be very dangerous. It is possible that the latter serum might be of value under conditions in which the serum could be kept and whole blood could not be obtained.

The special measures employed in shock, such as rebreathing, have never been shown to be of much value under experimental conditions.

SUMMARY

The term "shock" is used by the surgeon in describing a definite clinical condition; it is probably due to a number of causes. In general, however, all cases may be included in two groups. One group contains the cases in which the clinical manifestation follows some time after the occurrence of the conditions incident to the shock. The other group includes the cases in which a severe or fatal condition supervenes immediately on receipt of the active agent. Experimentally, either condition can be produced by few of the methods which may be compared to their clinical manifestations. Chief of the methods by means of which a condition simulating the cases included in the first group can be produced experimentally is exposure of the abdominal viscera. The symptoms thus produced are due to a loss of circulatory fluid, probably due to, or associated with, a failure of the mechanism to control fluid volume. The signs of shock may be produced by the loss of an amount of circulating fluid that can be sequestered into capillary beds of venous trunks of the four limbs. The part the nervous system plays in the cause of shock is undetermined. It cannot be proved beyond doubt, experimentally, that shock is an etiologic factor, although clinically it seems to be definitely established that it is responsible for death in some cases, and in such cases it will probably be found to be of the nature of inhibition. This group might include a large number of the cases contained in the second group. Experimentally, sudden death has been found to occur under deep etherization following stimulation of the nerves that inhibit respiration. It has also been produced under light etherization by the stimulation of nerves that produced an associated reflex inhibition of the heart. Either of these results may also occur clinically and the cause of death be described by the surgeon as shock. In the treatment of shock, experiments have not shown that the employment of drugs, either as stimulants or as vasoconstrictors, possesses very much value. The logical procedure, at least from the experimental standpoint, in the cases included in Group 1, would seem to be to attempt to replace the lost fluid. The best means of doing this is by the intravenous injection of large amounts of whole blood or blood serum. Some of the artificial solutions give good results. The ideal artificial fluid should contain, (*a*) some substance to increase colloidal properties, (*b*) alkaline salt, and (*c*) glucose.

RECONSTRUCTION OF THE COMMON BILE DUCT*

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Defects in the common bile duct may result from errors in operative technic, from strictures following ulceration or trauma, or from neoplasms. Since excision of the gallbladder has become a frequent practice, possibilities for injuring the common bile duct, particularly in inexperienced hands, have multiplied.

In an effort to devise some method that would be satisfactory in reconstructing the common duct, various procedures have been devised. Sullivan[1] described an operation in which a rubber tube is sutured into the stump of the hepatic or the remaining upper end of the common duct, carried into the duodenum, and surrounded with neighboring tissue and omentum. Molineus, according to Walton, has suggested the use of the appendix for reconstruction of the common duct. However, it is often difficult to secure a satisfactory appendix, the nutrition of the transplanted appendix would be very problematic, and it would carry bacteria it normally contains, which may cause cholangeitis. It is for the last mentioned reason that it has been found unwise to connect the gallbladder with the colon instead of with the duodenum.

Lewis and Davis[2] have used experimentally transplanted fascia from the abdominal wall to repair defects in the common bile duct of dogs. Stropeni and Giacinto[3] reported experiments in which a portion of a vein was used to fill a defect in the common duct.

Walton[4] reviewed bile duct surgery and described an operation in which he uses a duodenal flap. Eliot[5] has given the recent literature on repair of the bile

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* Read before the Section on Surgery, General and Abdominal, at the Sixty-Ninth Annual Session of the American Medical Association, Chicago, June, 1918.

* Because of lack of space, this article is abbreviated in THE JOURNAL. The complete article appears in the Transactions of the Section and in the author's reprints. A copy of the latter will be sent by the author on receipt of a stamped addressed envelop.

1. Sullivan, A. G.: Reconstruction of the Bile Ducts, THE JOURNAL A. M. A., Sept. 4, 1900, p. 774.
2. Lewis, Dean, and Davis, C. B.: Tr. Western Surg. Assn., St. Louis, December, 1913.
3. Stropeni and Giacinto: Zentralbl. f. Chir., 1914, **41**, 190; abstr., Gior. d. r. Accad. di med. di Torino, 1914, **77**, 21.
4. Walton: Surg., Gynec. and Obst., 1915, **21**, 269.
5. Eliot, Ellsworth: Surg., Gynec. and Obst., 1918, **26**, 81.

ducts, laying particular stress on the work of European authorities.

Moynihan[6] suggests the use of the jejunum in the same manner as the Y gastro-enterostomy of Roux. The upper part of the jejunum is cut across and the proximal (oral) end sutured end-to-side about 12 inches below the distal end. The distal end is then sutured to the gallbladder (Fig. 2). Clinically, if the gallbladder was normal, a cholecyst-enterostomy could be done, so the practical application of such an operation would be only where the end of the bowel must be attached to a small contracted gallbladder, or possibly to the stump of the hepatic duct. I have done six experiments after this method of Moynihan (Fig. 3). In all of them the dogs died.

Fig. 3.—Type of operation in six experiments done according to method of Moynihan.

The thin gallbladder when sutured to the thick intestine of a dog readily tears, and the powerful peristalsis pulls loose the sutures. In man, of course, the same anatomic conditions do not exist; but with such fatal results experimentally I would be unwilling to try this operation clinically, even with more favorable tissue.

It occurred to me that probably the transplantation of an everted vein might be successful. Theoretically, the advantages are that the vein, when turned inside out, would have the endothelial coat outside, and this would become adherent to the endothelium of the peritoneum and the surrounding raw surface and the nutrition of the vein be thereby readily established. The vein offers a thin, well organized tube which should require a minimum amount of nutrition as compared with a thick tube of fascia, and if the epithelium from the duct and the duodenum would grow in from the ends of the transplanted vein, we might find a permanent tube of definitely organized tissue that would be satisfactory. These theoretical premises were not borne out by experimental work, as will be explained later.

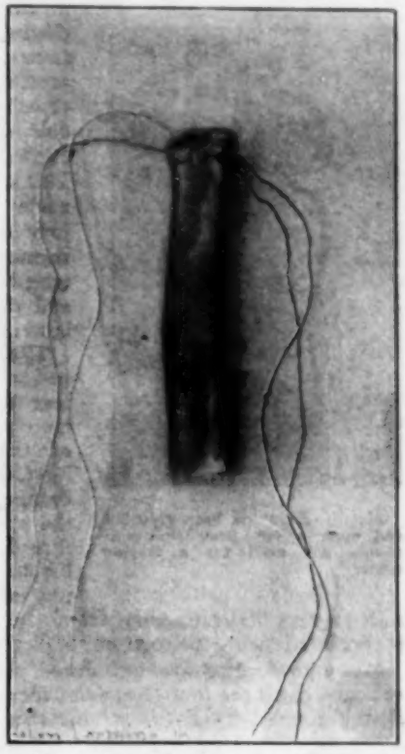

Fig. 4.—Segment of external jugular vein, which has been removed and turned inside out, with catgut and silk sutures placed in position.

TECHNIC

Sixteen experiments were done on dogs in which the following technic was developed:

The vein used is from the external jugular, which seems to serve best for this purpose in a dog and is very large. A ligature is placed at the lower portion of the external jugular, and after the vein has been dissected clean of fat another ligature is placed at the upper end. The length of the segment removed should be at least double the length of the duct to be reconstructed, as the vein contracts greatly. After removal a mosquito hemostat is inserted in the segment of vein at one end, and grasps a bite at the other end; then by pulling on the forceps the vein is turned inside out. The vein should be kept moist with salt solution, in order that it may be handled more satisfactorily. A suture of small tanned catgut is inserted at one end after the manner of a purse-string suture. It is tied so as not to constrict the caliber of the vein. This suture acts as a collar. Opposite the knot in the catgut a silk ligature is placed and left untied (Fig. 4). The vein is now ready for transplanting.

Fig. 5.—Common duct has been dissected free and serrefine placed on upper extremity. Dotted lines indicate point at which it is to be resected.

The common bile duct is dissected free, and a serrefine whose spring has been weakened as for blood vessel work is

6. Moynihan, B. G. A.: Abdominal Operations, 2, 3d edition, 334.

placed on the upper part of the duct (Fig. 5). It is important to preserve the peritoneal covering of the duct as much as possible, for this facilitates the healing of the transplanted vein to the stump of the common duct. A ligature is placed on the duct close to the duodenum, and the portion between the ligature and the serrefine is excised. A needle threaded with rather stout silk doubled transfixes the stump of the common duct (Fig. 6). This is a tractor suture and is made long enough for the four strands to traverse the segment of vein, take a small tube, as shown in Figure 11 *a*, and then dangle free in the bowel.

Fig. 6.—Duct has been resected and upper stump transfixed with double silk used for a tractor suture.

This tractor suture is not tied on the common duct for fear of occluding it, but is merely inserted. The object of this suture is twofold: First, it will afford immediate drainage for the bile along the suture, and, second, the thread with its attached rubber tube in the intestine will tug at the end of the duct and prevent its retraction from the vein. If the suture is anointed with petrolatum it is more easily handled.

Mosquito forceps are introduced through the segment of vein and catch the four strands of the tractor suture, drawing them through. Then two of the strands are threaded in a large needle, passed through a short piece of small rubber tube, and tied firmly to the other two strands (Fig. 7). One end of the catgut of the purse-string suture on the vein is now threaded in a small curved needle and catches a small bite in the duct about one-third inch from its end. It is tied snugly while pulling up the vein and pulling down the tractor suture so that the stump of the duct is invaginated into the vein. The ends of the catgut are cut short. Then the end of the silk ligature that was previously inserted into the vein is threaded into a needle, catches a bite of the duct, and is tied at a point about opposite the place where the catgut suture was tied. The silk is left long in order to bring the omentum up later on. In this manner the vein is fixed to the stump of the common duct which has been invaginated into the vein.

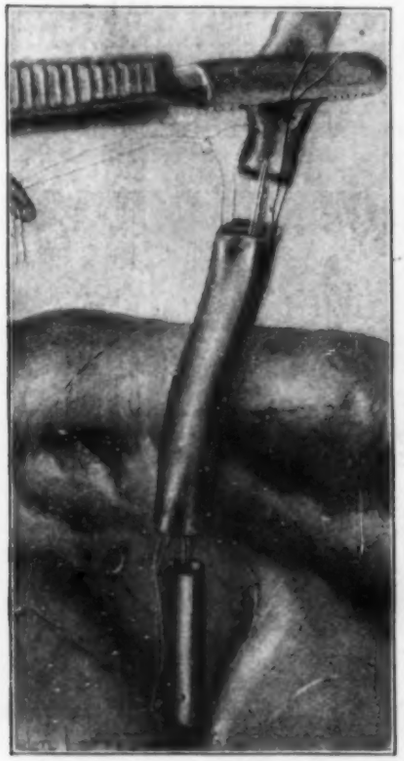

Fig. 7.—Tractor suture has been caught by mosquito forceps which were introduced through segment of vein, pulled through vein, carried through small rubber tube, and tied. Catgut and silk sutures have been carried through stump of common duct and are about to be tied.

A transverse or oblique incision is now made on the duodenum, going down to the mucous membrane but not through it. At the point of incision farthest from the common duct, the mucous membrane is punctured (Fig. 8). A

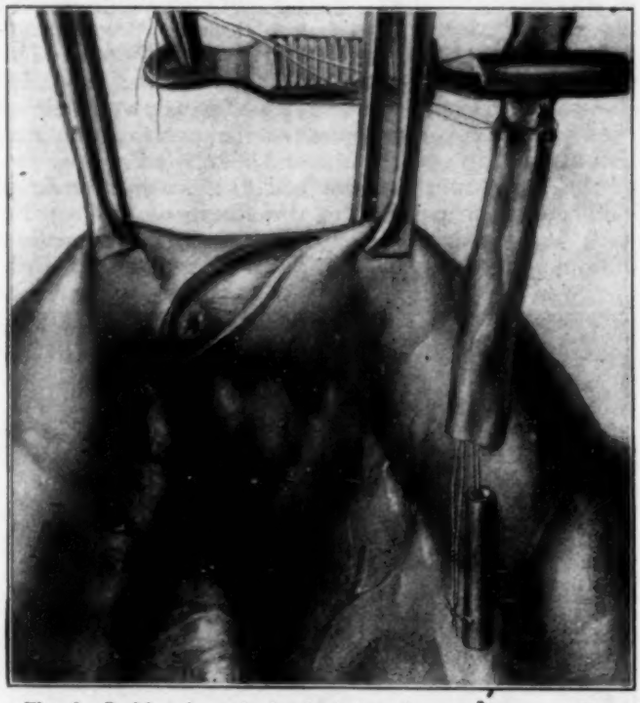

Fig. 8.—Incision is made in duodenum down to mucosa. Mucosa punctured at end of incision farthest from duct, utilizing the principle of Coffey.

silk or linen suture is passed through the edge of this puncture and catches the vein in at least two places. This suture

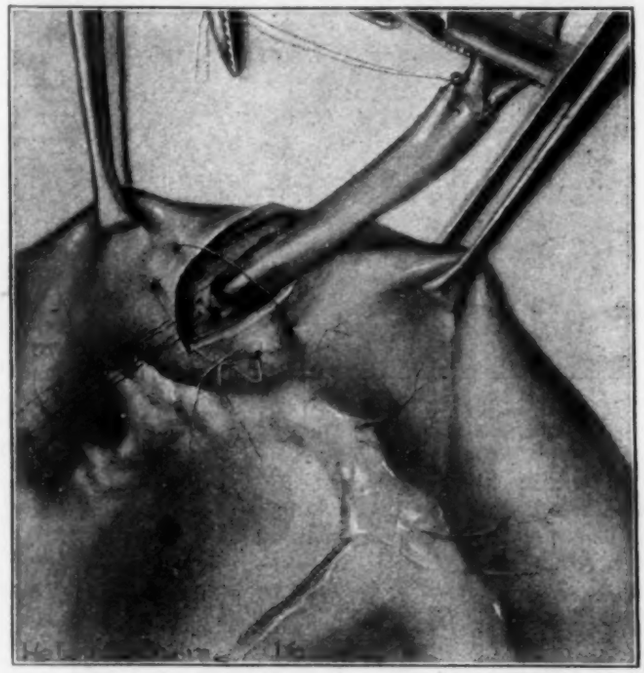

Fig. 9.—The tractor suture with rubber tube has been placed within the bowel. The vein has been fastened by a mattress suture through mucosa, and the wound in the duodenum is being closed.

is inserted from without in and returns from within out, so making a mattress stitch. It is tied, and the tractor suture on the common duct, together with the piece of rubber tube, is pushed through the hole in the mucous membrane (Fig. 9). A few interrupted mattress sutures bury the transplanted

vein, making its insertion oblique and using the mucous membrane as a valve as recommended by Coffey. The end of the silk suture that holds the vein in position at the upper stump of the common duct is now threaded on a needle, and a piece of omentum is brought up and held around the transplanted vein by means of this suture (Fig. 10).

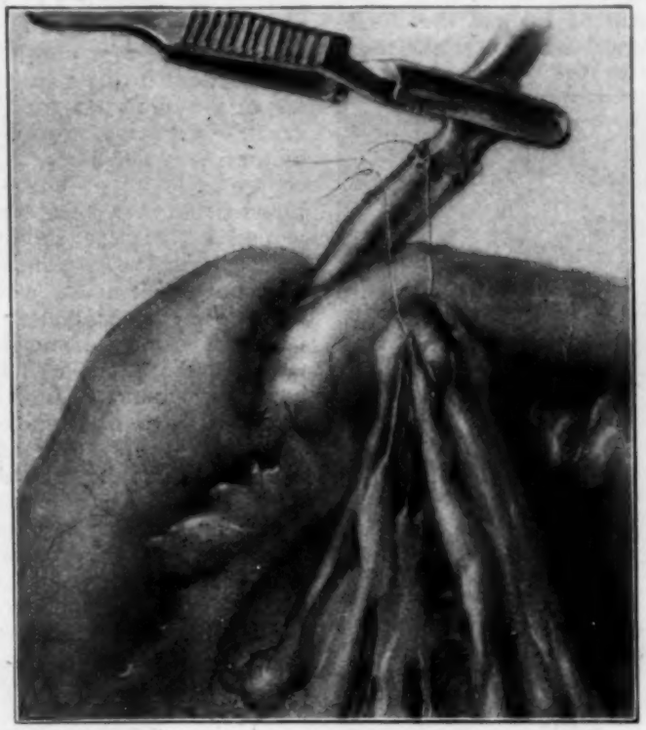

Fig. 10.—The long end of the silk suture in the upper part of the vein catches the omentum and holds it around the reconstructed duct.

RESULTS OF EXPERIMENTS

Of the sixteen experiments, in the first and the third dog there was no provision made for drainage of bile through the transplanted vein. Both died with leakage at the junction of the duct and the vein, the vein having become a solid cord. Six other dogs either died or were apparently about to die when killed within from seven to forty days after operation. In each instance there was occlusion of the transplanted vein.

In those that died soon there was usually leakage at the junction of the vein and the duct. One dog (Dog 14) died two days after operation, the abdominal wound having opened. Six dogs were in fairly good condition when killed from nineteen to forty-five days after operation. In one (Dog 7) the transplanted vein was distinctly patent thirty-six days after operation, and in another (Dog 13) nineteen days. In the other four the vein seemed to be well nourished, though it was occluded at the distal end. One dog (Dog 16) was killed under an anesthetic three and one-half months after operation. It had been well up to three weeks before being killed. It then began to look bad and became emaciated and jaundiced. Postmortem showed the reconstructed duct occluded and much shortened, and the common and hepatic ducts enormously dilated.

Dilatation of the common and hepatic ducts occurred in all cases, even when the reconstructed duct was still patent. This was probably due partly to interference with peristalsis and partly to pressure within the duct as well as to beginning obstruction.

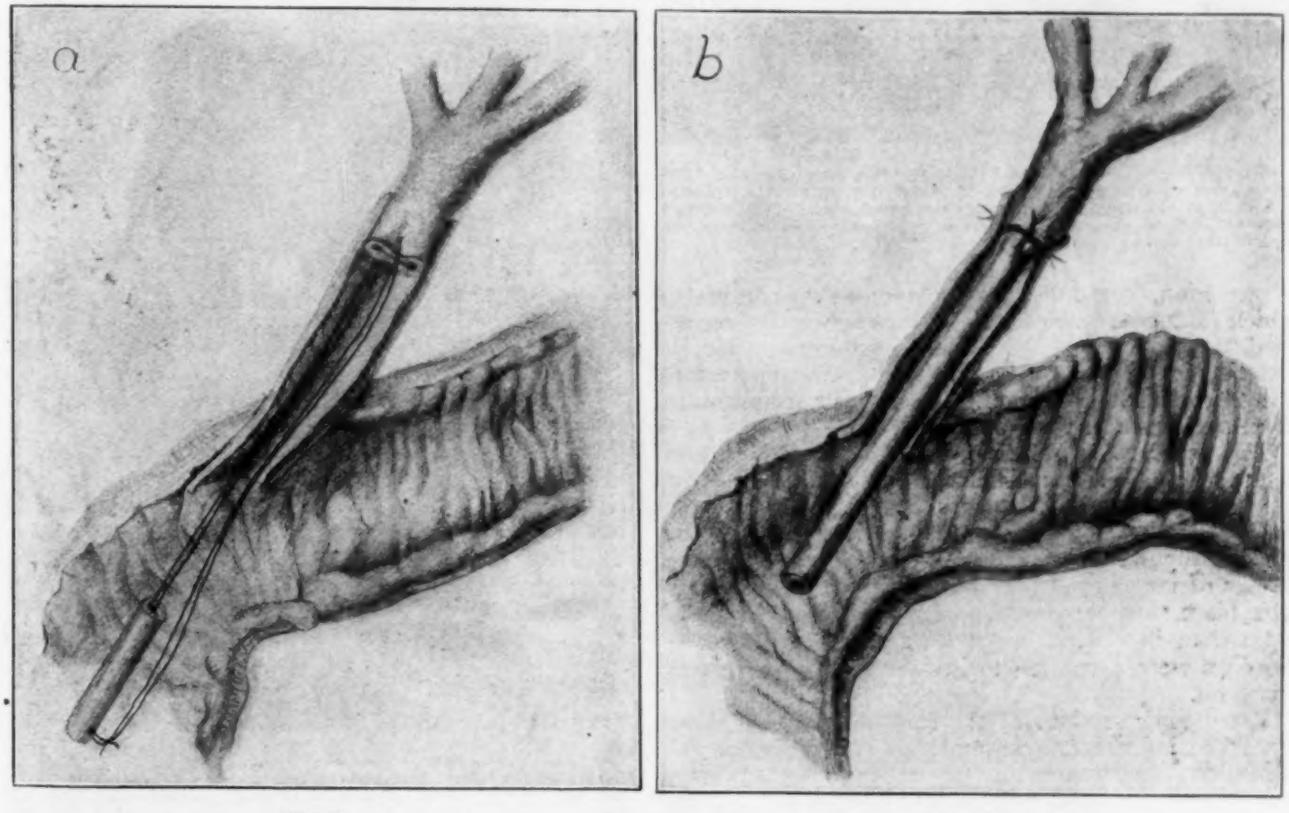

Fig. 11 A

Fig. 11 B

Fig. 11.—Sections showing: *a*, relation of the tractor suture in the reconstructed duct; *b*, modification in which small rubber tube was used instead of tractor suture. It did not have any material advantage.

The practical conclusion from these experiments seems to be that while it is possible to reconstruct the common bile duct with an everted segment of vein, the final result is unsatisfactory. In man the immediate danger from the operation, leakage at the point

Fig. 15 (Dog 16).—Specimen removed 109 days after operation. The transplanted duct is greatly shortened, completely occluded and buried in a mass of adhesions. It shows as a short cord connecting the dilated ducts to the duodenum. The dog was in good condition until about two weeks before death.

of junction, could be largely avoided by drainage, which is impracticable in a dog. When a dog recovered from the immediate effect of the operation, it did well for several weeks; but if the animal was permitted to live long enough, it became ill from one to three months after the operation.

The explanation of this failure is that it is due to contraction of the reconstructed duct, and analysis of the postmortem examinations and the microscopic findings throws some light on its cause. Though the everted jugular vein made a tube several times the caliber of the normal bile duct, contraction invariably took place. In some instances contraction was more rapid than in others, but it always occurred and, if the dogs were permitted to live, eventually there was occlusion.

Microscopic sections of the transplanted vein show a marked inflammatory round cell infiltration of the adventitia, the internal layer of the everted vein, whereas the outer layer, or the intima, with its adjacent coat, had very little infiltration (Figs. 17, 18, 19 and 20). This testifies to the irritating effect of bile on that layer of transplanted tissue with which it came in contact. Such continued irritation, resulting in prolonged infiltration with inflammatory products and small round cells, causes contraction.

COMMENT

There seems to be what might be called a biologic law of the immunity of tissue near an irritating discharge to the effects of that discharge. This immunity may be relative or absolute, but it appears to exist to some extent in the tissue immediately around the lining of the bile tracts, the bowel and the urinary apparatus. Operations, for instance, around the anus and in the perineum where contamination with fecal discharge cannot be entirely avoided are not often infected. In perineal prostatectomy, in which the wound is in close proximity to the anus, there is rarely infection, which is more common after the suprapubic operation, when only urine and no fecal matter come in contact with the wound.

The immunity of neighboring tissue to local irritating discharges is well illustrated by the healing of intestinal wounds. In a sutured intestine the peritoneal surface first unites, and soon after this the epithelium grows over the internal surface of the wound. Later, the submucosa and the muscular coats are repaired. The intestine finally straightens out, as shown by the early studies of Halsted and Mall, and repair eventually becomes practically perfect. Healing goes on with the fecal current flowing over the wound. But if a cut were made through the corium and all the layers of the skin of the arm, for instance, and the wound kept constantly bathed in fecal matter, as an intestinal wound is, repair, if it ever occurred, would be slow and with a large scar.

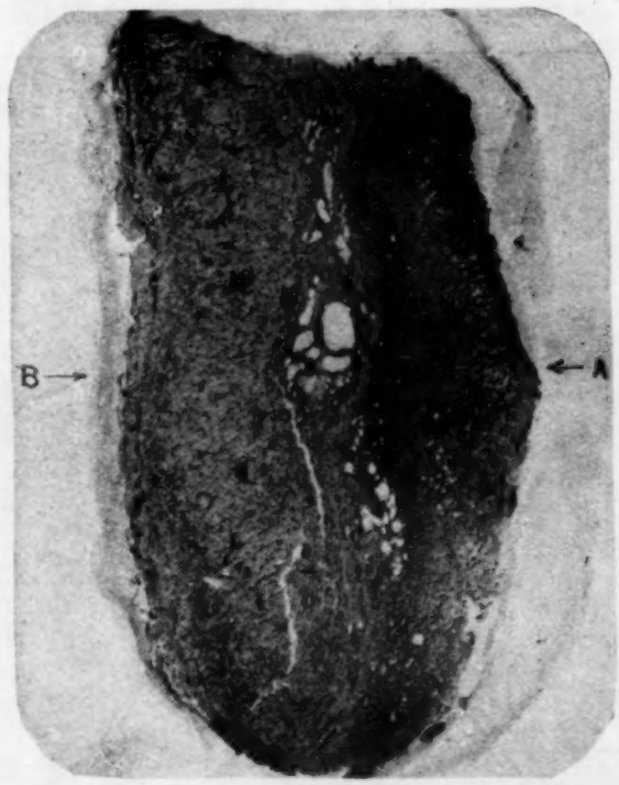

Fig. 17.—Section from transplanted vein in Dog 12. ×30. Note the internal surface of the transplanted vein (*A*) which consists of adventitia and shows marked infiltration of small round cells, while the external surface (*B*) is well preserved and is comparatively little infiltrated.

The Sullivan operation, in which a rubber tube is sutured into the stump of the common or hepatic duct, carried into the duodenum, and surrounded by the neighboring tissue and the omentum, is as much a

transplantation of tissue as when fascia or venous segments are transplanted. In one instance tissues in the neighborhood are made to form a channel around the rubber tube, and in the other there is a free transplantation. The Sullivan operation results in a biliary

Fig. 20 (Dog 7).—Transverse section of transplanted vein, thirty-six days after operation. Note contraction, folding in, and round cell infiltration around lumen; × 30.

fistulous tract, probably similar in general construction to an external biliary fistula that follows removal of a drainage tube after an operation that opens the bile tract. It is well known that the irritating effects of the bile and the resulting scar tissue tend to produce contraction and occlusion of such a biliary fistula to the skin. It has been asserted that in an operation of the type of the Sullivan operation, the epithelium from the stump of the duct would grow over the tract made by the tube and so prevent contraction. A similar hope was entertained by me in my early experiments, that the well organized and well nourished walls of a thin vein would form a satisfactory foundation for the epithelium to grow on. However, we found that unless the tissue has some immunity to the effects of an irritating discharge with which it is constantly bathed for a long time, inflammatory infiltration and contraction take place. In this respect the Sullivan operation, which utilizes the neighboring tissues, may be less liable to be followed by contraction than when tissue is transplanted from a distance, though the immunity of tissue outside the duct itself, even in close proximity to the duct, would probably not be very great.

An interesting fact emphasized by these experiments is that constriction and occlusion of the duct do not result from contraction of the epithelial tissue but of the connective tissue. This is universally true. The striking deformities that are seen in the face after a burn are, as a rule, healed over with epithelium; but the contraction is due to the scar tissue under the epithelium which replaced the corium. So in stricture of the urethra, the surface is rarely raw, but is usually covered with epithelium, the stricture occurring from contraction of the connective tissue which has replaced the submucosa. It is, then, contraction in tissue that corresponds to the corium in skin or the submucosa of mucous membrane that is responsible for such deformities or for stricture, even though the surface is completely covered with epithelium. That epithelium does grow over at least a portion of the reconstructed duct is shown by one of the accompanying photomicrographs (Fig. 21); but this in no way prevents ultimate contraction of the tissue that replaces the submucosa. I call attention to this fact because in a number of instances in the literature, the assumption seems to be that if the reconstructed duct is lined with epithelium, no contraction will occur.

If epithelium is removed from the skin or mucous membrane, and if the defect is not too large and the corium or submucosa has not been materially injured by trauma or infection, repair will be perfect; but if the corium or submucosa has sustained any but the slightest injury, a permanent scar will result. Scars resulting from mechanical trauma, such as a cut with a knife, are notoriously less extensive than those that result from burns, infection or chemical injury. After mechanical trauma when there is no infection, the damaged tissue is destroyed or removed and the adjoining cells are not affected. But in an injury from a burn or from a chemical irritant, which for this purpose includes infection and irritating discharges, besides those cells that are entirely destroyed many adjacent ones are affected though they may not be killed outright. Later, they atrophy and are replaced by scar tissue. This necessitates repair not only of the tissue that is killed outright, but of the cells whose vitality has been impaired in a zone outside of

Fig. 21 (Dog 12).—Section of junction of transplanted vein with stump of common duct (*A*, *A*) twenty-three days after operation, × 30. Note that the columnar epithelium has grown a considerable distance over on the transplanted vein; but its attachment was slight and was partly broken loose during section (*B*).

that in which complete death of cells occurred, and calls for a high degree of hyperemia and extensive connective tissue formation, which means a prominent scar and marked contraction. In a reconstructed bile

duct where a vein or other tissue that has no natural immunity against the chemical irritation of bile is used, we have the very conditions that produce a large amount of scar tissue, so subsequent contraction inevitably ensues.

The conclusion may be stated that repair of any structure over which irritating discharges flow should be made by tissues that are either wholly or partly immune to these discharges. Repair of defects of the common duct, then, should be done with a view to the avoidance of subsequent contraction which will surely occur, whether epithelium lines the newly constructed tube or not, if nonimmune tissues foreign to this region are used. It seems that the most satisfactory reconstruction occurs when the stump of the common or hepatic duct is sutured to the mobilized mucosa and submucosa of the duodenum. In this way epithelial and subepithelial layers of tissue that are accustomed to the biliary discharges are employed; and if an accurate approximation is made, the submucosa of the duodenum unites with the corresponding tissue of the stump of the duct, and no more contraction should occur than would take place after suturing a wound in the intestine. Dr. William J. Mayo has employed such a technic in his clinic for a number of years, and similar work has recently been reported by Dr. Le Grand Guerry.

RECONSTRUCTION OF THE CHOLEDOCHUS

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COLUMBIA, S. C.

Surgeons are occasionally forced to the necessity of reconstructing the common duct. Surgical literature is full of case reports, and many methods have been advocated by equally as many writers, involving the transplanting of fascia, the transplanting of blood vessels, the transplanting of the peritoneal layer of the duodenum, and so on to the end of the chapter. Some of the operations are good and others are distinctly bad.

Experimentally many plans have been tried on dogs with varying degrees of success. Unfortunately, what will work in the dog laboratory will not always work in the human abdomen, and the simple method I present, although done independently under the force of circumstances seven years ago at our hospital, is not an original plan, for in reviewing the literature I find case reports of almost the identical procedure. I do not wish the foregoing statement to be construed as a criticism of the invaluable experimental work carried on by Crile, Cushing, Horsley and many others, for we owe a large part of our progress in surgery to such work. I feel, however, that when due allowance has been made, there is a tendency among some to test the final value of a given method in the experimental laboratory rather than under actual conditions in the human body.

In January, 1916, Mayo[1] published a splendid article on "Restoration of the Bile Passages," which every one interested in this subject should read. The method described in this article is almost identical in principle with the one under discussion. It appears to me that in our effort to find something new under the sun we have focused our thought too much on the experimental laboratory and have overlooked the most natural way of overcoming these defects in the bile passages.

1. Mayo, W. J.: Surg. Gynec. and Obst., 1916, **22**, 1-6.

REASONS FOR RECONSTRUCTION

Some of the reasons why it is necessary to reconstruct the common duct are as follows:

1. In case of permanent obstruction at the head of the pancreas, if the gallbladder is intact, we shall have plain sailing. Cholecystoduodenostomy is, however, a short-circuiting operation rather than a reconstructing of the bile passages. If the gallbladder has been removed, there will be another story to tell.

2. It may be necessary to restore the bile passages on account of inflammatory stricture of the common duct. If the stricture of the common duct extends above the junction of the cystic and hepatic ducts, it may be necessary to excise the strictures and then, if possible, apply the method to be described, or the stricture may be divulsed.

3. The common duct may be divided in the operation of cholecystectomy. As a matter of fact, injuries to the choledochus are usually the result of operative measures. If the accident is discovered immediately, repair is much easier than if a secondary operation is necessary to correct the injury. It is vitally necessary to remember here that the junction of the hepatic and cystic ducts which form the common duct is not always at a fixed point.

Whenever we attempt the operation of cholecystectomy, the point just mentioned must be constantly borne in mind. The usual position at which the cystic duct enters the hepatic duct is about three quarters of an inch below that portion of the hepatic duct which lies within the liver itself. However, the junction of these two ducts which form the common duct may occur as high up as the fissure of the liver, or they may run parallel with each other and unite almost at the entrance into the duodenum. According to Gray's Anatomy, they may remain independent throughout their course, or the junction may occur at any point between the fissure of the liver and the duodenum.

Not only, then, do we have the junction of the hepatic duct and the cystic duct at a point whose location varies, but the two ducts running a parallel course and in intimate association one with the other and at times overlapping each other. When this unusual anatomic situation occurs, unless the two ducts are isolated and identified before the gallbladder is removed, accidental injury to the hepatic or common duct can and often does occur.

A case within the last few months beautifully illustrates this point. A male patient, aged almost 60, had a large stone in the ampulla of Vater, producing obstruction of the common duct. The hepatic and cystic ducts were both distended to the size of one's index finger and could be clearly traced almost to the duodenum before the junction was effected.

RESULTS OF OPERATION

The three essential things to be accomplished by the operation are as follows:

1. In certain of the cases in which the duodenum is closely bound down by adhesions, its mobilization is most important, as we are thereby enabled to effect the anastomosis with greater accuracy.

2. This step I believe to be fundamentally necessary. The essential thing, as the illustration will show,

is so to mobilize the mucosa of the duodenum that when the suture line is completed, the mucosa and the submucosa of the duodenum will be directly united to the light structures of the hepatic duct. If this is done, we shall have a continuous epithelial lined passage, and contraction in all probability will not occur. This point illustrates the inherent weakness in many of the so-called autoplastic reconstructions of the bile passages. Some of the methods break down just here, in that they fail to provide a continuous mucus lined passage for the bile.

3. The third objective to be attained is the one so clearly set forth by Dr. Horsley in the preceding paper. His experimental work shows clearly that contraction may occur in an epithelial lined sinus: "Construction is due to contraction of underlying fibrous or connective tissue and not to contraction of the epithelium itself" (Horsley).

The absence of a proper submucosa as a covering for the line of union may bear the same relation to the contraction of the anastomosis as the corium does to a burn of the skin. We do not have contraction in a superficial burn of the skin, because the corium, which consists of connective tissue, that is, elastic fibers, contributes elasticity to the skin. This portion, also the seat of the sensitive layer, is not destroyed. On the other hand, however, contraction always occurs when the corium is destroyed. The point is that the corium bears the same relation to contraction following a burn of the skin as the submucosa bears to contraction following anastomosis between the common duct and the duodenum.

CONCLUSION

I wish to make this point perfectly clear. I am not setting up the claim that this is the only way of remedying these defects in the bile passages. We may be quite sure that in many instances this method will not be suitable. What I do contend, however, is that the plan has a sound surgical and physiologic basis.

As the illustrations will show, the method provides a continuous mucus-lined passage and a submucosa from a location and under conditions as normal as we may hope to obtain. It appears to me, then, that in the group of cases suitable for this method of relief, the bile passages may be restored as nearly as possible to a normal condition.

Briefly then, my experience with reconstruction of the bile passages is confined to seven cases. One particularly interesting point about the third case was that the stump of the hepatic duct was so short that, try as I might, it was quite impossible to suture the duodenum to the hepatic duct. Consequently the gap between the two, which was about one-half inch in length, was bridged by a small rubber tube about the size of a No. 9 catheter. To my intense delight, the tube was passed about the fourteenth day, and, after a slight external drain of bile which lasted for about one month, this patient has remained well ever since.

There were two deaths in the seven cases. One death in a woman aged 70 was due to surgical shock and followed the operation within three or four hours. The second fatal case was due to postoperative pneumonia. One patient, who survived the operation and was alive four years afterward, had a small external biliary fistula that drained bile intermittently. Her health, however, was much improved, and since then she has passed from under my observation. The remaining four patients have remained well ever since the operation, and may fairly be regarded as complete symptomatic cures.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. HORSLEY AND GUERRY

DR. ARTHUR G. SULLIVAN, Madison, Wis.: I wonder if you fully grasp the significance of Dr. Horsley's statements as regards the influence of a lining epithelium on duct contracture? The question is constantly raised as to whether the epithelium actually grows and eventually unites in the new-formed canal made by my method. A sinus lined by epithelium is by no means insured against contraction. The old belief that epithelium itself would prevent contracture is not correct. Epithelium itself does not necessarily have any influence as regards keeping a duct patent, nor does its absence interfere with the discharge from a persistent biliary fistula. Do you ever worry that a persistent biliary fistula will close? Your chief worry is that it will not close. As long as there is obstruction so that the course of least resistance is for the bile to come outside, the bile will come outside, epithelium or no epithelium. You all have had experience with fecal and urinary fistulas and have worried considerably for fear they would stay open, although you knew full well that they were not lined by epithelium. As Dr. Horsley indicates, the character of the wall itself holds the secret as to whether a new-formed sinus will eventually contract, granting, of course, that there is a constant and regular discharge of bile through the sinus. The epithelium fully lined the new-formed ducts in my experimental work.

The various methods which have been proposed for bile duct repair have looked very well in the illustrations, but many of them cannot be utilized at all in the average case which requires duct reconstruction. The method portrayed by Dr. Guerry looks good, and it evidently has been successful; but to be candid, I can scarcely see that the end result of Dr. Guerry's operation, as indicated by his illustration, is at all different from Dr. W. J. Mayo's, in which he mobilizes the duodenum and sutures to it the divided hepaticus. I do not want you to get the wrong impression of my faith in the rubber-tube method. If you are faced with a predicament in which there is no gallbladder and no opportunity to unite the hepatic duct directly to the duodenum, put in a rubber tube and cover it with the tissues near at hand. As Dr. Coffey has stated, those tissues probably lend themselves better to the rather irritating effect of the bile than do those of a transplant. If you will do this, your efforts may be successful.

DR. C. N. DAVIS, Chicago: Dr. Horsley made mention of some experiments done by me some three years ago. We worked with fifty dogs and transplanted fascial flaps in an effort to repair the common duct. Our results were good and bad. In confirmation of what Dr. Sullivan has said, we found that the ducts made by fascial flaps were lined by epithelium. The great majority of our animals were lost because of stricture, not through the fascial tissue, but at a point where the duct had been cut across. We tried to obviate this stricture by cutting the duct in an oblique manner. But this seemed to have no effect whatever. A few of the animals survived, but the great majority died because of the constriction where the duct was cut. Two or three years ago a Chicago surgeon resected the common duct in doing a gallbladder operation. A drainage tube was put in and the patient allowed to drain. Some three or four months after that we put a tube in and reconstructed the common duct over a T-tube. The bile discharged through the long end of the T-tube and discharged normally into the intestinal tract. The tube was left in place for six months and the patient gained weight. Everything went lovely. A few months later the tube was removed, and in a short time the patient's condition was as bad as before the operation. She was operated on again, and later the tube was taken out, with a like bad result. She was operated on a fourth time. A T-tube was put in, and the patient says it will be removed only from her dead body.

DR. L. L. MCARTHUR, Chicago: I had not the advantage of the recent experimental research work on bile tract restoration

when I met with my first case in 1907. Dr. Sullivan's article had not then been published, so I improvised a means of reconstructing a common duct which had been injured in the preceding operation. The patient, who suffered two or three years with icterus whenever his gstula closed, but was relieved when it was open, desired something to be done. It was possible to find a dilated proximal common duct. The gallbladder had been removed at a former operation. Into this dilated common duct it was possible to introduce a rubber tube. There was no possibility in the cicatricial tissue which surrounded this field (he had had three previous operations) of finding the distal portion of it. So a pursestring suture was made in the duodenum at the point most closely lying to the proximal end of the common duct, and a tube introduced through an incision in the center of this area after a pursestring suture had been made in the common duct proximal end and a tube inserted. Reasoning that it was essential that that tube should come away not at once, but after some time, I did this: I turned back a cuff on the rubber tube about one-quarter of an inch, then turned that back again so that I had a round knob on the end of the tube about twice the size of the tube, narrowing its lumen, but permitting the bile to flow. With the proximal end in the common duct, it was easy to constrict the common duct, leaving its mucosa attached so that it brought it close to the duodenum. I wanted the tube to come away, but not too soon. I made it 8 inches long and let the 8 inches go down the duodenum, so that the constant peristaltic pulling for five or six weeks all that time gave a chance for epithelium to develop. That scheme works. I have done it now for the fourth time, and one of my associates, calling me to assist him in a difficult icteric case, repeated it successfully for the fifth time. The practical hint is, to follow the suggestion of Willy Meyer, bring the duodenum as close as possible to the stump of the proximal end of the common duct and keep it patulous until the mucosa can grow to mucosa. While the experience of any of us will not be great in numbers, so simple a resource as that described can be found in any operating room.

Dr. I. J. Strauss, Chicago: In 1912, when I reconstructed ureters from the fascia lata, I got a patent ureter. Epithelium will grow on any medium. You cannot prevent epithelium from growing over a hollow viscus. As to end results, experimentally from the bile duct work, success is due entirely to technical skill. If you take a fascial transplant uppermost, then the hydrostatic bile will distend the tube. Dr. Davis is correct. When I did ureteral work I did bile operations and put a stone into the duct. Then the hydrostatic action caused stricture, and you take out the stone and you have no stricture whatever. This shows that the bile within the common duct is under a very low pressure, and consequently there is always a constriction. If we have high hydrostatic action, we would have no pressure, and these cases of reconstruction of the bile duct would be a success.

Dr. J. Shelton Horsley, Richmond, Va.: The pathology of a biliary fistulous tract is intimately connected with such reconstructive work. Of course, the fistulas that do not close impress us. What is the proportion of external biliary fistulas that do not close to those that do? Exceedingly small. If they do not close we know the reason; usually some obstruction to the bile lower down. The Sullivan operation is as much a transplantation as when a vein or fascia is used and has the advantage of a pedicle for bland supply. Sullivan's procedure has the additional advantage, too, of using tissue in the neighborhood, which has some immunity to the irritating effects of the biliary discharges; but a free transplant is not so well nourished, has no immunity to the irritating discharges, and will eventually contract. The ideal method is to unite the stump of the duct to the submucosa of the duodenum. Dr. Sullivan has authorized me to say that he is in no way responsible for the T-tube. In pulling it out it causes too much damage.

Teach Health to the Children.—Since 90 per cent. of our American children leave school at or before the eighth grade, public health must be taught in the grades if the majority of the population is to be reached.—*Minnesota Public Health Association Journal.*

HEMOPHILIA

EXPERIMENTAL DATA BEARING ON THE EFFECT OF GLYCERINIZED EXTRACTS OF VISCERAL HEMOPHILIC TISSUE ON THE COAGULATION TIME OF BLOOD *

HARRY LOWENBURG, A.M., M.D.
AND
A. I. RUBENSTONE, M.D.
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Inasmuch as the active etiology of hemophilia remains one of the unsolved mysteries of medicine, and inasmuch as medical science affords us no remedial agent which will permanently eradicate the disease, the investigations to be recorded were undertaken with the hope that some new information with reference to the cause of the remarkably slow coagulative property of the blood in hemophilia might be provided. The opportunity to conduct these investigations came to us by reason of the death of a 6 year old lad, who presented the classical family history of this disheartening affection. He had been admitted to the pediatric service of the Mount Sinai Hospital of Philadelphia on several occasions. Each time profuse hemorrhage had followed the slightest trauma to skin or mucosa. Usually he bled from the tongue, mouth or lips—the result of teeth bites from falls. The slightest pressure would produce extensive subcutaneous ecchymoses. At no time would the bleeding cease spontaneously or by the use of ordinary measures. Horse serum or the direct injection subcutaneously of freshly drawn human blood was always necessary to control the bleeding. The anemia following one of these attacks was always profound, and frequently he would become highly toxic following an injection, presenting hyperpyrexia, delirium, urticaria and other evidences of the intracirculatory destruction of foreign protein. Once the bleeding ceased, however, his color and animation would return with amazing rapidity. His father did not bleed, nor did his mother, nor his sister, but his brother, who even now is a patient under the care of one of us (Lowenburg) at the Mount Sinai Hospital, just recovering from a severe hemorrhage following a slight trauma on the forehead, and which required intravenous transfusion to control it, frequently has attacks of bleeding. There is no history of consanguinity. His maternal uncle is a bleeder, having required intravenous transfusion to control what appeared to be spontaneous hematuria. This occurred on two occasions and almost cost the patient his life. Another maternal uncle bled to death. Thus it is seen that we are dealing with a typically classical case of hemophilia. Our patient died at the Mount Sinai Hospital following uncontrollable intestinal hemorrhage of unknown origin.

Assuming that the blood of hemophiliacs does not come in contact with extravascular tissues (skin, muscle, fascia, etc.), that the coagulation time under such circumstances is unduly prolonged beyond normal is not the subject of professional controversy. Howell's experiment, wherein he showed that hemophilic blood drawn directly into a test tube sometimes consumes five hours in clotting, may be readily verified by repetition. Normal blood is coagulated within from thirty

* Read before the Section on Diseases of Children at the Sixty-Ninth Annual Session of the American Medical Association, Chicago, June, 1918.

to forty minutes. Hemophilic blood presents no striking abnormal variations in the white and the red cell count and the blood plaques. Various authorities have, however, proposed divergent hypotheses as to the elemental causal factor, some ascribing it to an overabundance of anticoagulative substances and others to a deficiency of procoagulative agents.

Thus Morawitz, as well as Lossen,[1] attributed the defect to a lack of thrombokinase; Weil[2] attributed it to an excess of antithrombin; Wright, to calcium deficiency, while Addis[3] and Howell[4] showed experimentally that there was a lack of prothrombin. Howell, as well as Nolf,[5] found no calcium deficiency, and indeed Lossen proved that adding calcium to hemophilic blood causes no decrease in coagulation time. Howell, furthermore, demonstrated no deviation from a normal fibrinogen content and that the blood of a hemophilic, when brought in contact with the tissues of the same person, is coagulated rapidly. For example, if during venipuncture of a hemophiliac, the technic is faulty, and some blood traverses the subcutaneous tissues before it is drawn into a test tube, the blood will clot in little longer time than normal.

Since all workers are practically agreed that extracts of the external tissues exert a marked influence in diminishing the coagulation time of hemophilic blood, it occurred to us to investigate the effects of extracts or emulsions of the various internal tissues, both from our dead hemophilic patient, as well as from those of an apparently healthy, normal boy who died by accident, and to ascertain the effect of these, if any, on the coagulation time of blood.

Our work consisted in preserving samples of the following tissues: brain, thyroid, heart, liver, kidney, suprarenal, pancreas, spleen, muscle and bone marrow.

PREPARATION OF TISSUES

The tissues were cut into very small pieces, and washed in running water for about three hours to rid them of as much blood as possible. They were then ground in a mortar with three times their volume of physiologic sodium chlorid solution and a little glycerin was then added.

To test the effect of these tissue extracts on coagulation of blood, advantage was taken of the method outlined by Howell, consisting of first, oxalating blood plasma and then reactivating coagulation in such plasma by the addition of a suitable amount of calcium chlorid. In this way normal blood plasma clots uniformly in from eight to twelve minutes. The effect of the addition of the various tissue extracts to such preparations of plasma was easily ascertained by gently tilting the test tubes and observing closely how long it took the plasma to form a firm coagulum.

Blood from a normal person was drawn by venipuncture into a Lüer syringe and at once run into a test tube containing a solution of sodium oxalate in physiologic sodium chlorid solution, so that the oxalate was present in about 0.12 per cent. of the entire volume. The oxalated blood was then centrifuged and the supernatant yellowish green plasma pipetted off. The clotting of the plasma was reactivated by adding calcium chlorid as follows: 0.5 c.c. of oxalated plasma was placed in each of five test tubes, and to these were added in series of 0.1, 0.2, 0.3, 0.4, 0.5 c.c. of 0.5 per cent. solution of calcium chlorid, and the coagulation time observed in each test tube to ascertain which amount of calcium chlorid caused the quickest and most uniform coagulum. After several repetitions of this test 0.35 c.c. were found to be most efficient, and with this amount the plasma clotted in eight minutes and forty seconds. Any amount less or more than 0.35 c.c. caused slow, uneven, or no coagulation at all.

Into each of three test tubes were placed 0.5 c.c. of oxalated plasma, one drop of the tissue emulsion and 0.35 c.c. of the calcium chlorid solution. The tubes were closely observed and frequently gently tilted to determine the coagulation time. This procedure was carried out with every type of tissue studied, both hemophilic and normal, together with controls of calcium and plasma alone, glycerin alone, and with thromboplastin-Squibb and that prepared in our own laboratory. These reactions were repeated several times and corresponded with the result shown in the accompanying table.

COAGULATION TIME OF PLASMA AND CALCIUM AFTER ADDITION OF TISSUE

Extracts	Hemophilic Min.	Hemophilic Sec.	Normal Min.	Normal Sec.
Brain	4		3	
Thyroid	10	30	4	
Heart	4	15	4	30
Liver	9	45	5	
Kidney	4	20	3	40
Suprarenal	4	30	3	10
Pancreas	6	30	4	
Spleen	6		5	
Muscle	5		3	15
Bone marrow	6		4	25
Controls				
Oxalated plasma	No coagulation			
Plasma and calcium			8	40
Glycerin			8	30
Thromboplastin			2	(Squibb)
			2	20 (Ours)

RESULTS

It will be noted that the normal tissue extracts uniformly accelerate the coagulation time of the calcium plasma, and that most of the hemophilic tissues with the exception of thyroid and liver seem to exert almost the same influence on coagulation. Thyroid gland and liver not only caused a prolonged coagulation time, amounting to two and one-half times the corresponding normal tissues, but actually inhibited the action of the calcium added to the plasma, so that the coagulation of the calcium plasma was prolonged almost two minutes.

These observations were repeated with uniform results, and though admittedly limited to the tissues of one hemophiliac, yet they are strikingly significant, in that there is a possibility that the thyroid and even the liver may secrete an antithrombic substance or enzyme which may be in part, if not principally, the cause of the deranged coagulative mechanism of hemophilic blood. These observations are recorded with the purpose of stimulating further investigation along similar lines, hoping to localize the offending principle causing this now so-called idiopathic disease.

CONCLUSIONS

1. Not only the external tissues, but also the various other tissues of the normal body accelerate blood coagulation.

2. Hemophilic tissues, excepting thyroid and liver, have the same general effect on coagulation as normal tissues exert.

1. Morawitz and Lossen: Deutsch. Arch. f. klin. Med., 1908, **94**, 110.
2. Weil: Presse méd., 1905.
3. Addis, T.: Jour. Path. and Bacteriol., 1911, **15**, 436.
4. Howell, W. H.: The Condition of the Blood in Hemophilia, Thrombosis and Purpura, Arch. Int. Med., January, 1914, p. 76; Am. Jour. Physiol., 1912-1913, 1910.
5. Nolf, Ergebn. d. inn. Med. u. Kinderh., 1913, **10**, 275.

3. Extracts of the thyroid and of the liver of hemophiliacs markedly prolong coagulation of blood.

262 South Seventeenth Street—1703 East Moyamensing Avenue.

ABSTRACT OF DISCUSSION

DR. WILLIAM WESTON, Columbia, S. C.: In the treatment of these purpuric conditions, it may be well to keep in mind the marked effect that fresh fruit juices have on the coagulation of the blood. For instance, we know that in scorbutus fruit juices assist markedly in the coagulation of the blood.

RECENT STUDIES IN THE ANATOMY AND PHYSIOLOGY OF TENDONS

THEIR APPLICATION TO THE TECHNIC OF TENDON OPERATIONS *

LEO MAYER, M.D.

NEW YORK

My interest in tendons was first awakened in the year 1912, when, while I was acting as volunteer in the clinic of Professor Lange, the problem of preventing postoperative adhesions was assigned as an experimental study to Dr. Henze of New Haven and to me.

Fig. 1. — Cross-section (diagrammatic) through the tibialis anticus tendon 1 inch above the upper pole of the sheath.

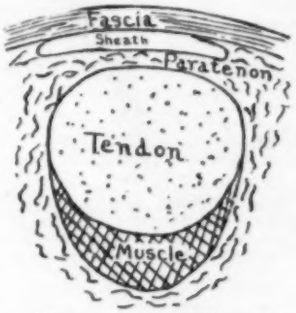

Fig. 2. — Cross-section (diagrammatic) through the tibialis anticus tendon at the level of the upper pole of the sheath.

The problem was one of great importance in Lange's eyes, since, despite his experience in 2,000 operations, the results were frequently impaired by adhesions developing subsequent to the transplantation.

It is, of course, self-evident that the function of the tendon as a means of transmitting the contraction of the muscle to the skeleton is completely inhibited by a single strong adhesion in the same way as the rope of the derrick cannot glide if clamped at a single point. In the course of our experimental investigations, which were conducted chiefly on rabbits, we utilized all manner of membrane, thin tubes of rolled silver, petrolatum, bismuth paste, fascia, peritoneum and a vein as a means of ensheathing the tendon. None of these substances, however, prevented the development of adhesions; in fact, with the exception of the Cargyle membrane, more adhesions were present after their introduction than in control experiments in which nothing was used. Finally we followed the suggestion of Biesalski and utilized the sheath of the paralyzed tendon as a physiologic pathway for the transplanted tendon; that is, one tendon was withdrawn from its sheath, cut away from the paralyzed muscle, and the substituting tendon drawn downward by means of a guide suture so as to occupy exactly the position of the original tendon. In all of the cases observed there was complete absence of adhesions, even when the limb was immobilized for thirty days subsequent to the operation.

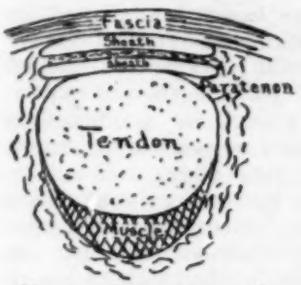

Fig. 3. — Cross-section (diagrammatic) through the tibialis anticus tendon one-half inch distal to the section shown in Figure 2.

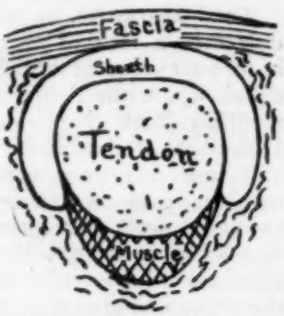

Fig. 4. — Cross-section 1½ inches distal to the section shown in Figure 3.

This clear cut evidence in favor of Biesalski's method indicated to me the importance of coordinating the operative technic with the physiology of the structures involved. Just exactly as the normal relationship between tendon and sheath should be maintained, so, too, the normal fascia relationship, the normal tension and the normal fixation of the transplanted tendon should be made as nearly like the normal as possible. When, however, I tried to follow out this line of thought, I found that our knowledge of the physiology and anatomy of tendons was entirely inadequate for the purpose. No one had as yet considered the nature of the gliding mechanism of tendons. In no book, physiologic or surgical, had the subject of tendon tension ever been brought up for discussion. Despite the thousands of tendon operations, some of the simplest facts relative to their anatomy had never been investigated. It was necessary, therefore, before any comprehensive operative technic could be formulated, that these fundamental questions be investigated. The work was conducted by research on the cadaver, animal experimentation and observations on human beings.

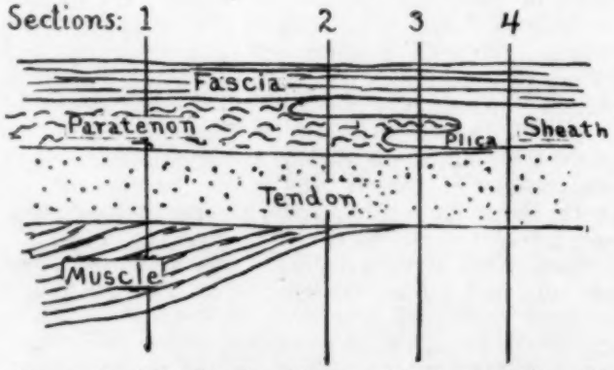

Fig. 5.—Longitudinal section (diagrammatic) of the tibialis anticus tendon, to correlate the preceding cross-sections. Note that the paratenon is prolonged downward into the sheath as a loose fold—the plica.

I can best introduce the subject of the anatomy of tendons by a series of cross-sections showing a tendon at various levels above and within its sheath. The first (Fig. 1) shows the tendon about 1 inch above the upper pole of the sheath; note that between the fascia and the tendon is a distinct gap not described

* Read before the Section on Orthopedic Surgery at the Sixty-Ninth Annual Session of the American Medical Association, Chicago, June, 1918.

in the textbooks. This space is filled with a peculiarly elastic tissue, consisting essentially of fat cells and elastic fibers. This tissue completely surrounds the tendon and the lowermost muscle fibers, and by means of its elasticity allows the tendon to glide freely to and fro beneath the rigid fascia. How great this elasticity is can be seen by incising the fascia and lifting the tendon out of its bed. It will then be seen to stretch from 5 to 7 cm. without rupture of its fibers. It is the important tissue in the gliding mechanism of the tendon; and in every operation on the tendons its presence must be recognized and due emphasis laid on conserving its function.

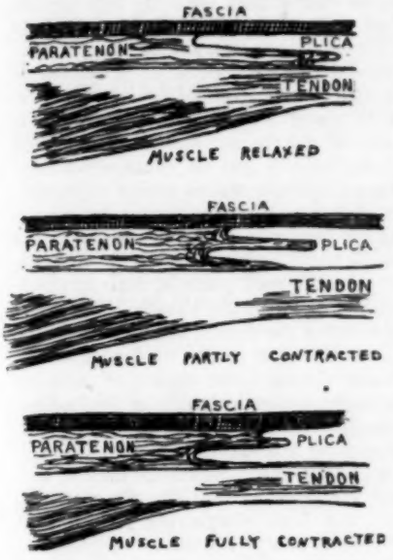

Fig. 6.—Diagrams representing the changes occurring in the form of the sheath during the contraction of the muscle and the consequent gliding of the tendon. Note that the deep pocket of the sheath between plica and tendon increases markedly in length, allowing the tendon to move upward without rupture of the sheath wall.

The next section (Fig. 2) is taken through the upper pole of the sheath. The significant fact is that the gap representing the tendon sheath does not develop between the fascia and the tendon, but between the fascia and this gliding tissue, which I shall henceforth term the "paratenon."

In the next section (Fig. 3), which lies about half an inch distal to the preceding, the sheath is seen to be divided into two portions by a transverse band, the tissue of which is microscopically identical with the paratenon.

In the fourth cross-section (Fig. 4), about 1½ inches distal to the preceding, the tendon sheath is interposed between fascia and tendon and is seen almost to surround the latter. A longitudinal section (Fig. 5) enables us to correlate these four cross-sections. It is evident that the paratenon is prolonged downward into the sheath as a tonguelike structure. The significance of this is appreciated only when the muscle contracts and the tendon moves upward; then it is seen that a kind of invagination occurs (Fig. 6). The deep pocket of the sheath becomes much elongated, thus allowing the tendon to glide, without destroying the continuity of the sheath wall. The essential, of course, is the elasticity of the paratenon which allows this degree of stretching.

By means of simple experiments on dogs the normal tension of tendons was accurately determined. The method consisted in the division of the tendon shortly above its insertion. The tendon ends separated for a distance of from 1 to 2 cm. because of the tension to which they were subjected by the muscular pull; by means of a recording instrument, the proximal tendon stump was pulled downward until brought into apposition with the distal. The degree of force represented the tension to which the tendon was subjected. The figures varied markedly, according to the varying conditions of the experiment, but one fact remained constant, irrespective of the size of the animal or the strength of the muscle: when under anesthesia, the limb was held in such a position that the origin of the muscle and its point of insertion were brought as near together as possible, then the tendon tension equaled 0; in other words, with the tibialis anticus divided and the foot held in the position of calcaneovarus, then under anesthesia the two tendon ends came into exact approximation without the use of any force whatever. This simple physiologic fact is readily applicable to tendon transplantation. The normal tension is restored by holding the limb in such a position as to approximate the origin of the muscle and the new site of tendon implantation.

I can best illustrate the application of the physiologic principle by outlining a typical tendon transplantation; for instance, the transfer of the extensor proprius hallucis for the paralyzed tibialis anticus. The first incision exposes the insertion of the paralyzed tendon. The tendon itself is slit longitudinally and the subjacent bone is traumatized. Against this traumatized surface the transplanted tendon is to be brought since the resulting osteogenic activity of the periosteal cells anchors the transferred tendon firmly in place.

The second incision runs along the extensor proprius hallucis. Not the entire tendon but only the upper portion is exposed at first. The idea is that the tendon should be protected against drying until everything is ready for its transfer. When the sheath of the extensor proprius hallucis is opened, it will be seen that it is separated from the sheath of the tibialis anticus by a fascial septum; by prolonging the incision a short distance upward one reaches a point where this septum stops short and the two tendon sheaths are separated only by a paratenon. At this point a small opening is made directly into the sheath of the tibialis anticus; a probe containing a guide suture is passed downward through the sheath and emerges just over the insertion of the paralyzed tendon. By means of this guide suture, the extensor proprius hallucis tendon, which is rapidly freed, is drawn downward through the sheath of the tibialis anticus and anchored firmly in the bed already prepared for it. In fastening it, the foot is held in the position of calcaneovarus and the tendon is pulled on with just enough force to render its course a straight one. Immobilization should not be continued more than three weeks

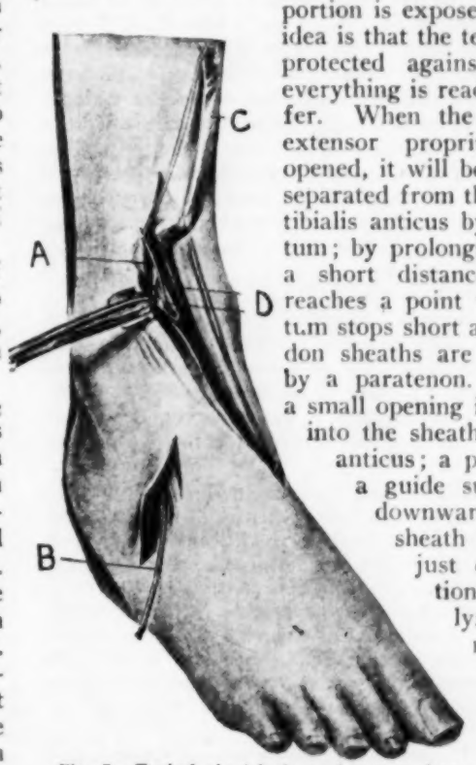

Fig. 7.—Typical physiologic tendon transplantation—transfer of the tibialis anticus for paralytic clubfoot. The probe passing through the sheath of the extensor longus digitorum emerges at the insertion of the peroneus tertius and serves to draw the tibialis tendon downward through the sheath of the paralyzed evertors. *A*, retracted fascia; *B* to *D*, probe passing through sheath of extensor longus digitorum; *C*, tibialis anticus.

because by that time firm union has occurred. The patient is then allowed to exercise the transplanted tendon, and three weeks later to walk with the transplanted tendon protected from undue tension by an appropriate splint.

The therapeutic results achieved by this method, in the 250 cases in which the operation has been performed in the last three and one half years, have been unusually gratifying.

This brief summary of the principles underlying the physiologic method indicates only in a rough way its application to the treatment of poliomyelitis and paralysis due to gunshot injuries. For further details the reader is referred to my book[1] and to a series of articles published in *Surgery, Gynecology and Obstetrics*.[2] Experience since that time, although it has altered some details, has confirmed me in the view that this method of tendon transplantation offers a valuable means of helping our patients.

149 West Seventy-Ninth Street.

ABSTRACT OF DISCUSSION

Dr. Arthur Steindler, Iowa City, Iowa: I wish to emphasize the importance of the physiologic method of tendon transplantation. Dr. Mayer said something about the clinical results. I can corroborate his statements by my own results, although they were not obtained entirely by his method. I made use of the principles mentioned in a series of about forty cases. The conclusion I can draw is that if the physiologic conditions are observed carefully, if the tendon sheath is either left unharmed, as he does, or reconstructed, as I am doing, according to an earlier suggestion of his, for which I am glad to give him credit; and, furthermore, if the vitality of the tendons is not endangered, and that is the only point, there is no failure of the tendon to work. I mean that it will act from a biologic point of view. I made a survey of my cases and found that it acted in almost every case, barring some cases of infection. With regard to the functional value, it acted functionally satisfactorily in 80 per cent., which is absolutely the converse of what I had found before using this method. One thing which makes me a little doubtful is the question of the dissociation of function. I saw a case in which a tendon transplantation had been performed several years previously and, I believe, successfully, because the tendon acted. After seven years it was, however, impossible for the patient to dissociate function between the two peronei tendons.

Dr. Ethan H. Smith, San Francisco: I should like to emphasize one point, and that is the outcome of tendon transplantation when there is infection. Its importance is well known to the orthopedist, but for the benefit of the general surgeon who is going to do tendon work as the result of military requirements, this point should receive particular attention. Infection is not always absent when a wound is apparently healed; we should be very certain that there is no latent infection before attempting any work on the tendons, because there is nothing that makes so complete a wreck as an infected tendon.

Dr. Charles M. Jacobs, Chicago: In tendon transplantation two important points must be considered: first, the technic, and second, the selection of muscles. In his demonstration Dr. Mayer used the extensor hallucis pollicis to take the place of the tibialis anticus. Notwithstanding the correct technic, the result would prove a failure, because a weak muscle cannot take the place of a strong one. In my opinion, many failures of tendon transplantation are due to the fact that we do not sufficiently consider this fact.

Dr. M. A. Bernstein, Chicago: I have carried on experiments for one year on tendon transplantation, following the technic of Dr. Mayer as closely as possible. My findings were as follows: In transplanting tendons into the sheath of other tendons there followed a traumatic inflammatory reaction, manifesting itself in infiltrative and proliferative change in the endothelial lining of the sheath. This inflammatory reaction depended on the amount of trauma of the tendon and the amount of adhesion, varying with the duration of immobilization of the limb. The microscopic findings are as follows: A proliferation of cells and an exudation of blood into the sheath, with fixation to the tendon to the peritendineum externum. I believed that adhesions, if permitted to organize, would produce ultimate fixation of the tendon. So we carried on experiments along different lines, transplanting the tendon with the sheath and the surrounding fascia, and made examinations varying from eight to twenty-one days after operation. We found, in the cases in which we transplanted the tendon with the sheath and surrounding tissue, that the proliferative change was not so extensive as in the other experiments. Even if there occurred a slight infection of the limb, the infiltrative change took place in the surrounding tissue, but did not extend down to the sheath. The question, therefore, comes up whether the sheath is essential in the transferring of tendons, and whether, if the tendon is transplanted without the sheath, through the sheath of another tendon, if the trauma brought about by rubbing the tendon over the wall of the sheath does not set up a traumatic inflammatory reaction with subsequent adhesions.

Dr. Leo Mayer, New York: Dr. Steindler and I disagree on only one point. He believes that the tissue which connects the tendon with the bone within the sheath, and through which the blood vessels run to the tendon (the mesotendon), should be kept intact in order to maintain the life of the tendon. Of course, it is a good thing to do this; but it is not absolutely necessary, because I have had a chance to observe that the tendon retains its vitality even when these blood vessels are divided. Of course, absolute adherence to physiologic principles in the other steps of the operation is required in order to secure success. The tendon must not be allowed to dry, and the time of exposure must not be more than half a minute. If everything is ready beforehand for the transfer of the tendon it is possible to accomplish this. The tendon gets enough blood vessels through the lower fibers of the muscles to keep it alive, since there is abundant anastomosis within the tendon.

Regarding the transplantation of the peroneus longus, I think that that is the best operation for paralytic valgus, since it converts a strong everter into an inverter of the foot. The trauma is more than offset by the function we secure.

Regarding infection, I endorse what Dr. Smith said. Never operate when there is infection. In the case of gunshot wounds, one should wait at least four months after the injury before operating.

In regard to the selection of the tendon, the point of Dr. Jacobs is well taken. Be very careful to select the right tendon. Do not send a boy to do a man's work. The extensor proprius hallucis should be transplanted for the tibialis anticus only when a strong tibialis posticus is present.

Dr. Bernstein's reports are exceedingly interesting, and I am glad that experimental work is being done to find out further details concerning the physiologic method. There is a certain amount of inflammatory reaction subsequent to the operation. If you draw a tendon down through the sheath of another tendon, there is bound to be some rubbing; but if you are careful it is not excessive. If you fix the tendon effectively you can begin active motion of the muscle three weeks after the operation and easily tear any adhesions that are forming. This occurred in one of my patients.

In operations at the knee there is no opportunity to use the sheath method. There are no tendon sheaths at the knee joint, but we can utilize physiologic principles. In the first place, we can maintain the normal tension of the tendon. The technic of doing this is simplified by inserting a few sutures in the quadriceps tendon which pull the patella upward. In the second place, you can render the course of the tendon as nearly normal as possible by not interfering with the paratenon, which surrounds the tendon. In these two respects the operation differs from that previously performed.

1. Mayer, Leo: The Orthopedic Treatment of Gun-Shot Injuries, Philadelphia, W. B. Saunders Company.
2. Mayer, Leo: Surg., Gynec. and Obst., 1916, **22**, 182, 298, 472.

THE BACTERIOLOGY OF MEASLES*

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Many attempts have been made to find the cause of measles and to study the bacteria that produce its complications. It may be of interest to review this work now, and for the sake of clearness of presentation the chief results may be discussed briefly under the headings of protozoa, miscellaneous, bacilli and cocci.

PROTOZOA

Bodies having some resemblance in form to protozoa have been observed in measles. Behla[1] believed that he could see such bodies in the blood; Doehle[2] described peculiar bodies in the leukocytes; and in blister-fluid Rosenberger[3] discovered minute refractile bodies with a rapid darting motion. Little if any significance can be assigned to the observations by Behla and Rosenberger, because they have not been confirmed and extended. Doehle's bodies do not appear to be at all peculiar to measles, being present in a wide variety of conditions (Glomset[4] and others).

MISCELLANEOUS

Under the head of miscellaneous come observations so fragmentary and inconclusive or made with such comparatively crude methods that the results now seem to have little or no value. Keating[5] states that Formad and he saw many micrococci in the blood in malignant cases of measles, during life as well as after death, the cocci being free and also within leukocytes. I place here the micrococcus which Manfredi[6] obtained from measles pneumonia and which caused "progressive lymphomas" in animals; and also the bacillus which Canon and Pielicke[7] in 1892 found in stained preparations of the blood, sputum, and the nasal and conjunctival secretions of fourteen measles patients. They regarded this bacillus as the cause of measles. It was an unevenly staining bacillus, gram-negative, variable in size, and though often present in large numbers, it was not obtained in pure culture. At about the same time Czaikowski[8] found in measles blood a similar bacillus, which he was able to cultivate, however, the colonies being like dewdrops and coalescing; but his work has not been confirmed. Combas and Giarrè[9] were unable to detect any microbes in measles blood with the methods used by Canon and Pielicke; Pacchioni[10] also failed; and others soon expressed doubts as to the value of this work.

Ostrovsky[11] cultivated an ovoid coccus or short bacillus, gram-negative, from the blood, saliva, eye and nasal mucus in measles.

In the spots in measles and in the nose, and occasionally also elsewhere, Mayer[12] found a small gram-negative bacillus, mostly in pairs, not pathogenic for animals, and forming small fluorescent colonies on agar. Mayer regarded this bacillus as a secondary invader.

In sections of lungs with measles pneumonia, Kuleysha[13] found a small bacillus, which, when injected into the blood of animals, caused changes in the lungs like those in measles. He believed that this bacillus was the cause of measles, and that pneumonia is a part of the disease, not a secondary complication.

From the blood in one case of measles von Nissen[14] cultivated a gram-positive bacillus which he called *B. roseus* because it formed red colonies.

Cannata[15] is said to have found a number of different kinds of bacteria in bronchopneumonia in measles, *Micrococcus tetragenus* and *Staphylococcus albus* being the most frequent.

Borini[16] cultivated a small, thin, gram-negative bacillus from the blood, bronchial mucus, and the conjunctiva of children at the height of the fever in measles. This bacillus grew best in vacuum cultures, forming punctiform, transparent, grayish white colonies which gradually coalesced; it caused bronchopneumonia and general invasion on tracheal, pleural and peritoneal injection of rabbits. It was pathogenic also for dogs. No further reports about this bacillus have appeared.

Lesage,[17] in 1900, described a very small, gram-negative micrococcus, which grew well on bloodless agar, and which he obtained from the nose and throat, less often from the blood, in measles.

Gundobin[18] cultivated a bacillus from the blood in sixty of sixty-four cases of measles and claimed good results from the serum of goats and horses injected with this bacillus. Ivanoff[19] described a short, motile, gram-negative, unevenly staining bacillus in the blood and mucous secretions in measles.

A few years ago Costa[20] announced that in eight consecutive cases of measles he found a blastomyces in the blood, but nothing further has been heard of it.

BACILLI

The principal bacilli that have been described in connection with measles may be grouped roughly as diphtheroid and as influenza or influenza-like bacilli.

Diphtheroid Bacilli.—Barbier[21] found the blood sterile, but in the conjunctival secretion he found a bacillus like the diphtheria bacillus, sometimes alone and sometimes associated with other bacilli. In the mouth and nose he noted mostly streptococci. Here belongs probably also the bacillus with club shaped and irregular

* From the John McCormick Institute for Infectious Diseases.

1. Behla, R.: Der Erreger der Klauen und Maulsuche nebst Bemerkungen über die akute Exantheme beim Menschen, Centralbl. f. Bakteriol., 1893, **13,** 50; Ueber das Vorkommen von Masern bei Tieren, ibid., 1896, **20,** 561.
2. Doehle, P.: Zur Aetiologie von Masern, Pocken, Scharlach, Syphilis, Centralbl. f. Bacteriol., 1892, **12,** 906.
3. Rosenberger, R. C.: Recent Studies in Measles, Am. Med., 1906, **12,** 139.
4. Glomset, D. J.: Intraleukocytic Bodies in Scarlet Fever, Jour. Infect. Dis., 1913, **11,** 468.
5. Keating, J. M.: The Presence of a Micrococcus in the Blood of Malignant Measles, Philadelphia Med. Times, 1881, **12,** 765.
6. Manfredi: Ueber einen neuen Micrococcus als pathogenes Agens bei infectiösen Tumoren: Seine Beziehungen zur Pneumonia, Fortschr. d. Med., 1886, **4,** 713.
7. Canon and Pielicke: Ueber einen Bacillus im Blute von Masernkranken, Berlin. klin. Wchnschr., 1892, **29,** 377.
8. Czaikowski: Gazeta lekarska, 1892; Centralbl. f. Bakteriol., 1895, **18,** 517.
9. Combas and Giarrè: Ricerche batt. sul sangue e sulle urine in alcune malattie infettive del' infanzia, Arch. ital. di clin. med., 1897.
10. Pacchioni, D.: Ricerche batt. nel morbello, Acte de Accad. med. fis. florent., 1902, **5,** 20.
11. Ostrovsky, E.: Bactériologie de la rougeole, Compt. rend. Cong. int. de med Moscow., 1899, **2,** Sect. 3, p. 174.
12. Mayer, A.: Zur Bakteriologie der Masern, München. Med. Wchnschr., 1904, **51,** 733.
13. Kuleysha: Measles Pneumonia, Dissertation, 1898.
14. Von Nissen, F.: Der Masernbacillus, Arch. f. Dermat. u. Syph., 1902, **60,** 429.
15. Cannata, S.: Ricerche batteriologiche nelle bronco-polmoniti morbillose, Clin. bed. ital., 1907, **46,** 406; Centralbl. f. Bakteriol., I, Ref., 1909, **42,** 203.
16. Borini, A.: Ricerche batteriologiche sul morbillo, Riforma med., 1905, **21,** 674; Bakteriologische Untersuchungen über den Morbillus, Centralbl. f. Bakteriol., I, O., 1906, **40,** 194.
17. Lesage: Bull. et mém. Soc. méd. d. hôp. de Paris, 1900, **3,** 9.
18. Gundobin, N. P.: Bacteria of Measles, and the Serum Against That Disease, Vrach Gaz., 1905, **12,** 1029.
19. Ivanoff, A. A.: Bacteriology of Measles, Med. Obozr., 1905, **64,** 320.
20. Costa, S.: Sur la présence d'un blastomycete dans le sang des rougeoleuse (note préliminaire), Compt. rend. Soc. de biol., 1913, **74,** 62.
21. Barbier, H.: Bactériologie de la rougeole, Sem. méd., 1897, **17,** 37.

forms described by Arsamasskoff[22] in the blood, the throat, the eye, and in pneumonic foci in measles.

Zlatogoroff[23] made cultures of the blood of twenty-four patients at the height of measles, inoculating from 25 to 150 c.c. of liquid medium with about 1 c.c. of blood, and in the cultures from seventeen there grew a thick gram-positive bacillus with rounded ends and arranged usually in pairs or small groups. Subcultures do not seem to have been successful. In a few instances similar bacilli were seen in stained preparations of the blood. The results of injection of the cultures into animals were not definite. From the conjunctival secretion Zlatogoroff usually obtained what he calls the xerosis bacillus and a similar but smaller gram-positive bacillus.

In the course of a study of the pneumonia of measles, Ciaccio[24] found a gram-positive, unevenly staining bacillus in sections of the lymph nodes, the spleen, the lungs and other organs of eight patients. In the lungs were also cocci, notably what he regarded as pneumococci.

Armand-Delille[25] reports the recovery of diphtheria bacilli or diphtheroids from the throat in about 42 per cent. of small children with measles. He states that the bacilli were rarely virulent, and that when virulent there was nearly always a membrane present.

Influenza Bacilli.—From about 1899 to about 1907 there appeared several reports which indicate that at least under certain circumstances influenza or influenza-like bacilli frequently occur in measles. In 1899, Paltauf[26] demonstrated the presence of influenza bacilli in bronchopneumonic areas in measles, calling attention at the same time to the presence also of cocci (pneumococci and streptococci). Albrecht and Ghon[27] noted the same thing a little later, and Giarrè and Picchi,[28] Jehle,[29] Süsswein,[30] Giarrè and Carlini,[31] Pacchioni and Francioni;[32] and Davis[33] followed with more extensive observations. In measles patients, Pacchioni found hemolytic bacilli in the eye, in suppurative arthritis, meningitis and pleuritis, and also in the heart blood after death. Giarrè and Picchi, found a minute gram-negative bacillus, which grew only on blood agar and best on pigeon blood agar, in the bronchial mucus and the conjunctival secretion in measles. Hiarri[34] examined the blood in measles with negative results, but in the eye he found an influenza-like bacillus and a diplostreptococcus pathogenic for white mice. He found the influenza-like bacillus also in the bronchial mucus of eight cases.

It may be of interest to note here that before any of these observations had been made, Cornil[35] found a great number of small bacilli as well as cocci in the lungs of an infant that died from bronchopneumonia consecutive to measles and whooping cough. Thaon[36] also found bacilli and cocci in pairs and short chains in measles pneumonia, the cells in the alveoli being filled with them; he regarded these organisms as the cause of the bronchopneumonia that was present in every measles patient dying in a certain hospital the air in which he believed was contaminated.

Jehle found the bacillus of influenza in the eye commonly and in the blood after death in fifteen of twenty-three cases of measles, and also but not so commonly in scarlet fever and in varicella. He believed that these diseases in some way favor general infection with the influenza bacillus when it is present on the tonsils or in the bronchial mucus, and that this form of secondary infection may cause a high mortality. Süsswein found the influenza bacillus in the nose of measles patients during life, and after death in the bronchial contents and the pneumonic and pleural exudate; and as influenza infection appeared to him to be a frequent and dangerous complication of measles, he recommended separation of patients with mixed infection from those with pure measles, in order to lessen the number of deaths. Liebscher[37] also found influenza bacilli in measles, during life and after death, though not so often as Süsswein; but he notes that the patients that had the bacillus in the nose gave a higher death rate than those that did not have it.

Continuing their work, Giarrè and Picchi found a hemophilic bacillus as the predominating organism in the conjunctival, nasal and bronchial secretions. It was a short, thin, gram-negative bacillus, growing only on agar with pigeon blood. In seventeen instances in which the blood was examined before or after death, this bacillus was found only three times. Later Giarrè and Carlini made a special study of the blood for this bacillus in twenty-four cases of measles, mostly in the eruptive period, and in six children that had had measles; the cultures from the latter were all negative, but in twenty-one of the measles patients the cultures were regarded as successful, although subcultures were obtained only twice. In stained preparations of the centrifugate of the laked blood, they report that they saw the bacilli in practically every instance of measles. In seven instances the bacillus in question, which they regard as the same as that described by Giarré and Picchi[28] in 1900, were grown from the eye in measles and studied in subcultures. They grew the pneumococcus from the blood three times and observed it in stained blood specimens five times.

Pacchioni and Francioni, however, failed to grow hemophilic bacilli from the blood in measles. They examined twenty-five patients, mostly just before the eruption, inoculating blood drawn from the veins on various mediums. A hemophilic bacillus appeared only once, and that was in the case of a patient who later died of bronchopneumonia. In seven instances, cultures developed of a large, gram-negative coccus, shaped like the coffee-bean, and regarded as *M. catarrhalis*. They also failed to find bacilli in centrifugates of laked measles blood, using the same method as Giarrè and Carlini, and they suggest that the latter probably erred in their interpretation. As they found the blood sterile in the early stages of measles,

22. Arsamasskoff: Gazeta Botkina, 1898; Centralbl. f. Bakteriol., 1899, **25**, 831.
23. Zlatogoroff, S. J.: Zur Mikrobiology der Masern, Centralbl. f. Bakteriol., I, O., 1904, **37**, 249.
24. Ciaccio, Carmelo: Beitrag zur pathologischen Anatomie und zur Mikrobiologie der Masern, Virchows Arch. f. path. Anat. 1910, **100**, 378.
25. Armand-Delille, Paul: Examen bactériologique de la gorge au point de vue du bacille diphtherique et pseudodiphtherique dans 75 cas de rougeole chez l'enfant, Arch. de méd. d. enf., 1902, **5**, 202.
26. Paltauf, R.: Wien. klin. Wchnschr., 1899, **12**, 576.
27. Albrecht and Ghon: Beitrag zur Kenntniss der Morphologie und Pathologie des Influenzabacillus, Ztschr. f. Heilk., 1901, **22**, 29.
28. Giarrè and Picchi: Jahrb. f. Kinderh., 1900, **52**, 890.
29. Jehle: Ztschr. f. Heilk., 1901, **22**, 190.
30. Süsswein, Julius: Die Influenza bei Masern, Wien. klin. Wchnschr., 1901, **14**, 1149.
31. Giarrè and Carlini: Ueber die Anwesenheit eines hemophilen Bacillus im Blute Masernkranker, Arch. f. Kinderh., 1907, **46**, 262.
32. Pacchioni, D., and Francioni, C.: Bakteriologische Untersuchungen an Masern: Beitrag zur Aetiologie und Pathogenese der Masern, Jahrb. f. Kinderh., 1908, **68**, 391.
33. Davis, D. J., Bacteriology of Whooping Cough, Jour. Infect. Dis., 1906, **3**, 1.
34. Hiarri: Ueber die Bakteriologie der Masern, Jahrb. f. Kinderh., 1902, **55**, 109.
35. Cornil and Babes: Les bactéries, 1890, **2**, 274; Contribution a l'étude des inflamations liées à la présence des microbes, péripneumonie contagieuse, pneumonie rubéolique, etc., Arch. de phys., 1883, **15**, 227.
36. Thaon: Des broncho-paeumonies de l'enfance et leur microbes, Compt. rend. Soc. de biol., 1885, **37**, 617.
37. Liebscher, Karl: Ueber Influenzabacillen—Befunde bei Masern und Scharlacherkrankungen, Prag. med. Wchnschr., 1903.

Pacchioni and Francioni hold that in uncomplicated measles there probably are no bacteria in the blood, and that in the instances in which bacteria actually were cultivated from the blood it concerned secondary infections due to a weakened resistance, hemophilic bacilli seeming to be the most frequent cause of such infection.

Reisz and Gins[38] observed influenza bacilli in the blood in a nursling with bronchopneumonia after measles.

In this country, Davis seems to have been practically the only one who has studied the question of the relation of the influenza bacillus to measles. He examined twenty-two uncomplicated cases, making cultures and smears from the sputum, and when sputum was not obtainable, from throat swabs. Only one examination was made in each case, but all the examinations were made during the eruptive stage, cough being present as a rule. Influenza-like bacilli were isolated in pure culture in thirteen of the twenty-two cases; in four such bacilli predominated, but sometimes there were only very few. Streptococci and pneumococci were present on every plate, the latter being the more numerous. Davis found influenza-like bacilli in the throat of only two of twenty normal persons.

It should be noted, however, that Cole's[39] mouse inoculations with the sputum of measles bronchopneumonia, the main result of which was the recovery of hemolytic streptococci in sixteen of seventeen cases, in eight of the cases also gave *B. influenzae*. Further, that while the sputum cultures in thirty cases all yielded hemolytic streptococci, in thirteen of the cases the influenza bacillus also was found. This bacillus was present too in the lungs and the heart blood after death in some cases together with streptococci, but these cases did not seem to differ from others in which only streptococci were found.

The comparative frequency of *B. influenzae* is of considerable interest, and it may be well in the further study of the bacteriology of measles not to lose sight of this bacillus.

COCCI

Streptococci.—The pioneer work on the bacteriology of measles was done by Babes[40] about 1880. In stained preparations of the nasal, conjunctival and bronchial secretions, of the blood of the skin in eruption, Babes found small cocci in pairs and short chains. In one case the blood contained also a short bacillus. In sections of the skin removed during life on the second day of the rash he saw micrococci in the dilated capillaries of the papillae. Agar cultures of the blood from the skin, of lymph nodes, and of inflammatory products of the lungs and pleura, gave streptococci like the streptococci in pus; occasionally the pulmonary and pleural exudate would develop in culture an encapsulated microbe that killed rabbits. In sections of lungs with measles pneumonia, in which Babes described the interstitial lesions recently emphasized again by MacCallum,[39] large numbers of cocci were found. Commenting on these observations, Cornil and Babes discuss briefly the question whether pneumonia may be an expression of a generalized measles; they held that of the bacteria in the lesions consecutive to measles, the streptococcus merited the most attention.

Tobeitz[41] found groups and chains of cocci in and about the bronchi in measles pneumonia.

In sections as well as cultures from bronchopneumonia in measles, Guarnieri[42] obtained streptococci regarded as identical with *Streptococcus erysipelatis*.

Méry and Boulloche[43] found pneumococci in the saliva of 29 per cent. and streptococci in 23 per cent. of young children with measles, these being larger percentages than in the case of well children. They reason that in measles there occurs a specific lesion in the lungs—an enanthem—on the basis of which secondary bronchopneumonia, due to a superficial, descending, respiratory infection, may develop. To guard against this bronchopneumonia, mouth cleanliness is recommended.

After death from measles, Slawyk[44] found streptococci in the blood in fifteen of sixty-eight cases and only two or three other bacteria scatteringly. The streptococcus cases included nine cases of enteritis, two of bronchopneumonia, two of empyema, etc.

Pospischill's[45] contention that streptococcus infection in measles and varicella usually is in reality a septic scarlet fever has not received any notice.

In scarlet fever, measles and other acute infectious diseases, Hlava[46] isolated a streptococcus, which formed a homogeneous capsule when grown on mediums with a high saccharose content, and which he called *Leuconostoc hominis*. Hlava regarded the coccus as different from *Streptococcus pyogenes* and suggested that possibly acute infectious diseases are caused by different forms of this coccus, which he obtained from the throat and nasal secretion of all the eight measles patients he studied and twice from the blood. He found streptococci also in sections of the lungs and of other organs in measles bronchopneumonia.

In forty-five cases of simple angina complicating measles in adults, Simonin[47] found streptococci as the predominating organism in the throat in twenty-five and staphylococci in sixteen. The pneumococcus was found only rarely.

In otitis after measles, Albesheim[48] found streptococci and staphylococci in pure culture and also associated with a gram-positive bacillus.

Schottelius[49] found *Staphylococcus aureus* in the conjunctival secretion of fifty-one cases of eighty examined and also streptococci, but not so often. In the lungs and spleen of children that had died from measles, a streptococcus was found regularly, occasionally associated with other bacteria.

Folger[50] and Eckert[51] each describe two cases of ful-

38. Reisz, E., and Gins, H. A.: Influenza-Bakteriaemia, Centralbl. f. Bakteriol., I, Ref., 1912, **53**, 135.

39. Cole, Rufus, and MacCallum, W. G.: Pneumonia at a Base Hospital, THE JOURNAL A. M. A., April 20, 1918, p. 1146. Cole, Rufus: Prevention of Pneumonia, ibid., Aug. 24, 1918, p. 635.

40. Babes: Adatok akangaro és a kangaros tidolob koroktanatioz, Orvosi hetilap, 1881.

41. Tobeitz: Die Morbillen, Arch. f. Kinderh., 1887, **8**, 322.

42. Guarnieri, G.: Streptococco nella bronchopulmonita morbillosa, Bull. d. r. Academia medica di Roma, 1886-1887, 13; Centralbl. f. Bakteriol., 1888, **3**, 205.

43. Méry, H., and Boulloche, P.: Recherches bactériologiques sur la saliva des enfants atteints de rougeole, Rev. mens. d. mal. de l'enf., 1911, **9**, 154.

44. Slawyk: Bakteriologische Blutbefunde bei infektiös erkrankten Kindern, Jahrb. f. Kinderh., 1901, **53**, 505.

45. Pospischill: Rubeola und Doppelexanthem, Jahrb. f. Kinderheilk., 1904, **59**, 723.

46. Hlava: Leuconostoc Hominis in seine Rolle bei den akuten exanthematischen Krankheiten, Centralbl. f. Bakteriol., I, O., 1902, **32**, 263.

47. Simonin: Les angines banales chez les rougeoleux adultes: étude clinique et bactériologique, Bull. et mém. Soc. méd. d. hôp. de Paris, 1903, **3**, 20, 83.

48. Albesheim: Beitrag zur Bakteriologie der Masernotitis, Arch. f. Ohrenh., 1903, **53**, 89; Centralbl. f. Bakteriol., I, Ref., 1903, **32**, 247.

49. Schottelius, A.: Bacteriologische Untersuchungen über Masern Konjunctivitis, München. med. Wchnschr., 1904, **51**, 378; Centralbl. f. Bakteriol., I, Ref., 1904, **35**, 485.

50. Folger: Sepsis nach Masern, Jahrb. f. Kinderh., 1897, **46**, 49.

51. Eckert: Sepsis nach Masern, Charité-Annalen, 1909, **33**, 182.

minant streptococcus sepsis in measles, such apparently being rare occurrences.

Craig[52] reports an outbreak of measles in a military camp involving eighty-nine cases, in twelve of which bronchopneumonia developed with ten deaths. In nine of ten fatal cases there were empyema and abscesses of the lungs. In all the fatal cases a rapidly growing streptococcus was cultivated from the lungs and the spleen, accompanied in six instances by the pneumococcus, in three by staphylococci, and in one by *B. proteus*. Craig found severe lesions—hemorrhages, focal necrosis, hyaline degeneration—in all the organs, and emphasizes the virulent nature of the infection.

Menschikoff[53] made a systematic bacteriologic study of sputum, nasal mucus, conjunctival secretion and ear discharges and blood in measles. Diplococcal forms predominated in the ear and the eye, and pneumococcus-like bacteria were grown from the blood in nine of sixty-one cases. On hemoglobin-agar plates the sputum gave deep brown colonies of a diplostreptococcus (*Diplostreptococcus brevis*) which he regarded as distinct from the pneumococcus; this being the only bacterium present constantly, he suggested that it may play the same rôle in measles as the streptococcus in scarlet fever. Menschikoff also isolated a gram-negative bacillus which grew only on hemoglobin-agar or blood-agar mediums.

Eyre[54] studied twenty cases of bronchopneumonia in measles and obtained the pneumococcus in pure culture four times, the streptococcus five times, the pneumococcus mixed six times, and the streptococcus mixed five times, mostly the one with the other but also with the staphylococci, influenza bacilli, etc. The examinations were made usually a few hours after death, but sometimes during life on aspirated material.

Lorey[55] seems to have been the first to use blood agar in the study of the bacteriology of measles. He examined the throat and made blood cultures in 150 cases; the tonsils gave hemolytic streptococci and in many cases also diphtheria bacilli and pneumococci; the blood in fifteen cases gave cultures of streptococci and in seven others also pneumococci, colon bacilli, paratyphoid bacilli, etc. In the middle ear discharges there were mostly streptococci. Lorey holds that the streptococcus is the most dangerous invader not only in scarlet fever but also in measles, and that probably the variations in the severity of measles epidemics are due to variations in the spread and invasiveness of streptococci, which may be spread by the hands of nurses, by playthings, eating utensils, etc., as well as by droplets. Lorey recommends that in hospitals children with streptococcus infection be isolated.

Recent observations indicate clearly that the hemolytic streptococcus has been the principal cause of the outbreaks of bronchopneumonia following measles in our military camps during the past year (Irons and Marine,[56] Cole and MacCallum, Levy and Alexander,[57] Cumming, Spruit and Lynch,[58] and Dick[59]). Cole reports that hemolytic streptococci were present in cultures of sputum coughed up from the deeper parts of the respiratory tract in the thirty cases of postmeasles bronchopneumonia examined, and mouse inoculations with such sputum from seventeen cases yielded streptococci in sixteen. Blood cultures during life in fifteen cases gave hemolytic streptococci twice. Of the thirty cases, death occurred in fourteen at least, and in all hemolytic streptococci were found in the affected parts of the lungs and in the pleural exudate in practically pure culture; the blood also usually contained hemolytic streptococci. MacCallum found the abdominal organs free from streptococcal invasion, but in the areas of interstitial bronchopneumonic lesions, which were characteristic of streptococcal bronchopneumonia, streptococci were present on the pleural exudate and in the bronchi, and in the purely lobular pneumonic areas they were often present in amazing numbers in the exudate. It appears as if the streptococcus infection in these cases was less violently virulent than in the cases described by Craig in which there were severe lessions—hemorrhages and necrosis—in the abdominal organs. This difference might be explained as the result of a somewhat greater parasitism on part of the strains concerned in the cases studied by Cole and MacCallum.

That nonhemolytic streptococci also may cause complications of a serious nature in measles is indicated in the report by Lathrope[60] of a series of cases of acute mastoiditis, forty-four of which followed measles (either directly or within a month after dismissal from the hospital), and in which the dominant organism seemed to be of the *S. viridans* type.

How are measles patients infected with hemolytic streptococci? The facts at hand point directly to droplet, contact and dust infection by way of the throat. It appears that hemolytic streptococci may spread easily in military camps and in measles wards when special precautions are not enforced. Irons and Marine found that, during a period of respiratory infections, hemolytic streptococci developed in the throat cultures of about 70 per cent. of healthy soldiers. Levy and Alexander obtained hemolytic streptococci from the throat in 14.8 per cent. of strictly fresh recruits; but in an organization in which most of the men had been in service about six months, the number of streptococcus carriers was no less than about 80 per cent. Of the measles patients admitted to the base hospital of this camp, most of them coming from the organization just mentioned, 77 per cent. were carriers of hemolytic streptococci, and the complications occurred almost exclusively among the streptococcus carriers, bronchopneumonia with empyema due to streptococci being by far the most frequent and the most important. Cumming, Spruit and Lynch report that while 35 per cent. of measles patients had hemolytic streptococci in the throat, this was the case in only 6 per cent. of healthy soldiers. Cole and his associates found that in a measles ward 56.5 per cent. of the patients harbored hemolytic streptococci in the throats as compared with 21.4 per cent. in a ward for patients suspected to be tuberculous. They found the hemolytic

52. Craig, C. F.: The Etiology and the Pathology of Bronchopneumonia Complicating Measles, The Journal A. M. A., April 15, 1905, p. 1187.

53. Menschikoff, W. K.: Zur Bakteriologie der Masern, Russk. Vrach, 1904; Centralbl. f. Bakteriol., I. O., 1906, **37**, 490.

54. Eyre: Bacteriology of Bronchopneumonia, A Statistical Analysis, Jour. Path. and Bacteriol., 1909, **14**, 160.

55. Lorey, A.: Bakteriologische Untersuchungen bei Masern, Ztschr. f. Hyg. u. Infectionskr., 1909, **63**, 135.

56. Irons, E. E., and Marine, David: Streptococcal Infections Following Measles and Other Diseases, The Journal A. M. A., March 9, 1918, p. 687.

57. Levy, R. L., and Alexander, H. L.: The Predisposition of Streptococcus Carriers to the Complications of Measles: Results of Separation of Carriers from Non-Carriers at a Base Hospital, The Journal A. M. A., June 15, 1918, p. 1827. Alexander, H. L.: Hemolytic Streptococcus Causing Severe Infections at Camp Zachary Taylor, Ky., ibid., March 16, 1918, p. 775.

58. Cumming, J. G.: Spruit, C. B., and Lynch, Charles: The Pneumonias: Streptococcus and Pneumococcus Groups, The Journal A. M. A., April 13, 1918, p. 1066.

59. Dick, G. F.: A Bacteriologic Study of the Pneumonia Occurring at Camp Pike, Ark., The Journal A. M. A., May 25, 1918, p. 1529.

60. Lathrope, G. H.: Acute Mastoiditis as a Complication of Infectious Diseases, The Journal A. M. A., Aug. 10, 1918, p. 451.

streptococcus in the throat of 11.4 per cent. of the measles patients on admission; after from three to five days in the ward in 38.6 per cent. and after from eight to sixteen days in 56.8 per cent. These valuable observations all point unmistakably to the ease with which the hemolytic streptococcus may pass from carrier to noncarrier and in the measles convalescent set up bronchopneumonia and empyema. In connection with this postmeasles streptococcus infection, it is of interest to recall that Tunnicliff found the phagocytic power of the leukocytes for streptococci reduced in the leukopenic stage of measles, and MacCallum notes that in the lung lesions he studied there was not free phagocytosis of streptococci. We know that in measles the tuberculin and other allergic reactions are enfeebled and even suppressed, and it may be that the frequency of streptococcus infection in this disease depends in some degree on reduction in the powers to react against streptococci.

The Tunnicliff Diplococcus.—Using anaerobic methods, Ruth Tunnicliff[61] recently has cultivated a coccus from the blood during the early stages of measles in forty-two of fifty cases, mostly in children.

It appears that at the height of measles, diverse bacteria may develop in cultures of the blood by special methods. Thus Tunnicliff in her series obtained examples of aerobic and anaerobic diphtheroid bacilli, filamentous organisms, spirilla, pigment and spore-forming bacilli, and staphylococci. Similar organisms occur in the throat, nose and eye.

The coccus in question seems to be most numerous in the blood shortly before the rash comes out and to disappear when the rash fades. Aerobic cultures and anerobic fluid cultures gave no results, the best results being obtained with semicoagulated horse serum and with whole blood in ascites glucose agar in the form of shake cultures. As a rule growth would appear in from five to fifteen days at 37 C. In subcultures the coccus may grow under aerobic conditions, when it forms small, greenish, as a rule nonhemolytic colonies on blood agar, the growth on glucose agar being moist and more profuse. A small coccus when first isolated, it passes Berkefeld N filters, but in subcultures it becomes somewhat larger. It is gram-positive and occurs as single cocci, especially as round or flattened diplococci, and in short chains. It ferments glucose, saccharose and maltose, but not inulin, salicin or raffinose.

Tunnicliff has isolated this coccus from the throat in measles, also from the nose and eyes, and in a single instance from the ear. Early in the attack, smears from the tonsils and anterior pillars may show large numbers of diplococci, like those in the cultures, the picture being different from that in similar smears from cases of scarlet fever and of rubella. For this purpose the smears may be fixed with heat, stained a few seconds with carbolgentian violet, washed and dried.

Extensive animal experiments with the coccus or its products have not been made, but it kills rabbits without causing any special changes, and caused leukopenia in a monkey. In regard to its immune reactions, Tunnicliff reports a rise in the opsonic index of the blood serum in measles as the symptoms subside, lasting from one to four days, and at this time the serum also contains complement-fixing bodies in feeble concentration. Tunnicliff and Brown[62] find that specific agglutinins and opsonins develop in the blood of rabbits injected with the coccus, but agglutinin tests are difficult because the coccus clumps spontaneously, and consequently the opsonin test is the best method yet known to differentiate this coccus from other cocci with similar cultural and morphologic characteristics.

Whatever the relation of this coccus to measles, the results just sketched call for further work along various lines.

61. Tunnicliff, Ruth: Observations on Bacteriology and Immune Reactions of Rubeola and Rubella, Jour. Infect. Dis., 1918, **22**, 462; Observations on Throat Smears in Measles, Rubella (German Measles) and Scarlet Fever, THE JOURNAL A. M. A., July 13, 1918, p. 104.

SUMMARY

From this review it appears that the chief bacteria to engage the attention in connection with measles at present are: (1) the diplococcus found by Tunnicliff in the blood early in the attack and in the throat and nose; (2) influenza bacilli, and (3) hemolytic streptococci. As opsonins and probably other bodies specific for the Tunnicliff diplococcus come into the blood in the course of the measles attack, this coccus must be of some significance, but the exact significance we have still to learn. While hemolytic streptococci seem to predominate overwhelmingly in the bronchopneumonia and other allied acute processes in measles, influenza bacilli are found so frequently in the throat secretions and in lung lesions that doubt arises as to their harmlessness. Hence the part played by these bacilli in measles should be studied further. As hemolytic streptococci may spread rapidly among measles patients, and largely it would seem by droplet and throat infection, the best way at hand to avoid the most serious complication of measles, namely, streptococcus bronchopneumonia, is early isolation of the patient under conditions that protect against infection from persons, including fellow patients, that may harbor streptococci. Such isolation protects against other infections (pneumococcus, influenza bacillus) also. The possible danger of streptococcus infection by way of food should not be overlooked. Finally, it is evident that the immunology of the streptococci concerned, their unity or plurality, their changes in virulence, and other problems require continued investigation.

62. Tunnicliff, Ruth, and Brown, M. W.: Jour. Infect. Dis., to be published.

The Health of Women in Munitions Manufacturing.—Women less than 23 years old are better fitted physically for the heavier work of munitions manufacturing than those further along in years, according to the results of an investigation of conditions in English factories made by Major Greenwood of the welfare and health section of the Ministry of Munitions. The investigation related to about 40,000 employees of eighteen representative factories in Great Britain. It was found that the older women, a large proportion of whom were married, were doubly handicapped by their age and their home duties, when they were employed in the heavy factory work, such as the making of projectiles and shells. In the lighter work, however, such as the making of fuses, cartridges and explosive supplies, these handicaps had little adverse effect on the health of the workers. The difficulty seemed to lie not in the general strain of factory life, but in the moderate degree of actual physical labor required, which taxed the health of the older women far more severely than that of the younger. With a view to prevent wastage in labor and to promote greater efficiency, the author suggests a preliminary medical examination for all women munitions laborers, as well as a redistribution of feminine labor between the two types of factories, so that each woman will have a chance to do the kind of work best suited to her strength.

Military Medicine and Surgery

A STUDY OF DIPHTHERIA CARRIERS IN A MILITARY CAMP

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Writers on military hygiene have affirmed that diphtheria has never been of serious importance in the Army, for the reason that it is easily controlled. This opinion is not shared by the officers on duty at the Base Hospital, Camp Doniphan, since their experience has demonstrated that, under certain circumstances, an epidemic of the disease is exceedingly difficult to overcome.

During the early months of 1918 the control of diphtheria, with especial reference to the carriers of the disease, was a very serious problem, which for a long time seemed but little influenced by the strenuous efforts of the staff.

As shown in Chart 1, a few cases were constantly present from October, 1917, but it was not until the latter part of January, 1918, that the disease began to show a marked upward tendency. From that time it persisted, despite the most earnest efforts and carefully devised safeguards, for nearly four months.

During the period cited, 461 cases and 686 carriers of diphtheria were observed. In their study, nearly 30,000 cultures were made and examined.

By the greatest of good fortune, the degree of virulence of the responsible organism was slight. Only three deaths occurred, all as the result of myocardial degeneration, and the individuals concerned were already enfeebled as a result of antecedent disease.

The condition, however, was serious militarily, since it compelled the withdrawal, from organizations engaged in intensive training for war, of more than a thousand men. These were separated from their commands for long periods, since the vital question was not how quickly a person might be returned to duty, but how long before it would be safe for his organization to receive him.

The infection was exceedingly tenacious. The means employed for the control of the epidemic, though in many respects more vigorous than those suggested by authorities on the subject, for a long time barely sufficed to maintain an equality between outgoing and incoming cases.

The intramural situation gave most concern. At a time when but few cases were under treatment, it was discovered that more than half of the twenty-six wards contained carriers, among patients and attendants. Though cultures were made of all in such wards, and infected individuals removed, the next search, at an interval of from five to seven days, was sure to reveal at least as many more who harbored the organism.

The epidemic was finally overcome only when available susceptibles had been segregated, or, in the course of military events, had been transferred elsewhere.

STATISTICAL BASIS OF THIS SURVEY

No attempt is made in this paper to discuss the treatment of clinical diphtheria, its complications or results, as that subject has been thoroughly treated by others. We are chiefly interested in the discussion of the diagnosis, treatment, results and control of the carrier condition and the epidemiology of the outbreak in this camp.

The data for this paper were derived from (*a*) the study of 686 diphtheria carriers and 461 cases of clinical diphtheria; (*b*) the incidence of *B. diphtheriae* in patients admitted to the head surgery section; (*c*) the results of operative treatment in 294 diphtheria carriers; and (*d*) laboratory investigations.

CLASSIFICATION OF CARRIERS

Carriers may be thus classified:

1. Primary carriers: A, transient; B, chronic.
2. Secondary carriers.

A primary carrier is one who has never had clinical diphtheria. In transient carriers the bacilli do not find more than a temporary resting place, the reason being that the nasal passages are normal and the tonsils are quite healthy or have been enucleated. The chronic carrier is one in whom positive cultures are obtained for an indefinite period of time. In some of these individuals the carrier condition is intermittent. Following a series of negative cultures, positive cultures recur at irregular intervals. Reinfection, overgrowth by other bacteria and the fact that the organisms are deep in the crypts and have not manifested themselves on the surface at that examination may be suggested as possible reasons.

The secondary carrier is one who, having recovered from clinical diphtheria, still continues to harbor the germs of the disease.

TABLE 1.—NUMBER OF CULTURES EXAMINED

Year	Month	Positive		Negative	
		No.	Per Cent.	No.	Per Cent.
1917	October	10	52.6	9	47.4
	November	90	22.9	302	77.1
	December	138	7.6	1,684	92.4
1918	January	350	9.2	3,462	90.8
	February	805	18.9	3,455	81.1
	March	1,236	15.3	6,849	84.7
	April	1,451	25.1	4,330	74.9
	May	456	8.9	4,702	91.1
Total		4,626	15.5	25,193	84.5

THE VALUE OF CULTURES

The carrier condition can be determined only by means of cultures. A single negative culture has but little value, as is proved by these figures: Of 294 cases in which tonsillectomy was performed for the relief of the carrier state, cultures taken from the tonsils immediately preceding the operation yielded positive results in 57 per cent. of the cases, and negative results in 43 per cent. Cultures of the tonsils after removal gave positive results in 77.2 per cent of the cases. The fact that negative cultures were obtained in 22.8 per cent. of individuals in whom the carrier condition had been definitely proved emphasizes the necessity for caution in overestimating the value of a single negative culture. In a number of instances a pure culture of *B. diphtheriae* was obtained from tonsils removed from patients who had not been identified as carriers. But these patients had had the disease from four to fourteen weeks previous to admission and had been released on the required number of negative cultures. As is

well known, negative cultures may be obtained at times from cases that run the course of typical clinical diphtheria.

The value of nasal cultures is not fully appreciated. That a nasal culture is of great importance is well illustrated by the case of a carrier who was under observation for a period of four and one-half months. Cultures from the nose were much more consistently positive than those obtained from the throat. Tests made on several occasions showed that the organism present in the nose was distinctly virulent for guinea-pigs.

These figures illustrate the returns that may be expected in all types of nasal and pharyngeal carriers. Of 700 cultures from the nose and throat, positive returns from the nose were obtained in 26 per cent. of the cases, while those from the throat were positive in 31.7 per cent.

SYSTEM EMPLOYED IN MAKING CULTURES

On the appearance of a clinical case of diphtheria or of a carrier, the regimental surgeon was requested to have all contacts appear at the regimental infirmary at an hour most convenient to the company commander, usually at 1 o'clock or immediately before a formation. When a second or a third case appeared in the same company, cultures were taken from all members of the organization in order to ascertain if carriers were present.

The cultures were taken from the nose and throat and planted on Loeffler's medium, one tube being used for both swabs. Tubes were then collected and returned to the laboratory for incubation and examination. Tubes of the medium, together with sterile swabs, were distributed weekly to each regimental infirmary in order that cultures could be promptly taken in all cases of sore throat. The inoculated tubes were then delivered to the laboratory by the ambulances on their regular rounds. After incubation for from eighteen to twenty-four hours, cultures were smeared and stained with Loeffler's methylene blue.

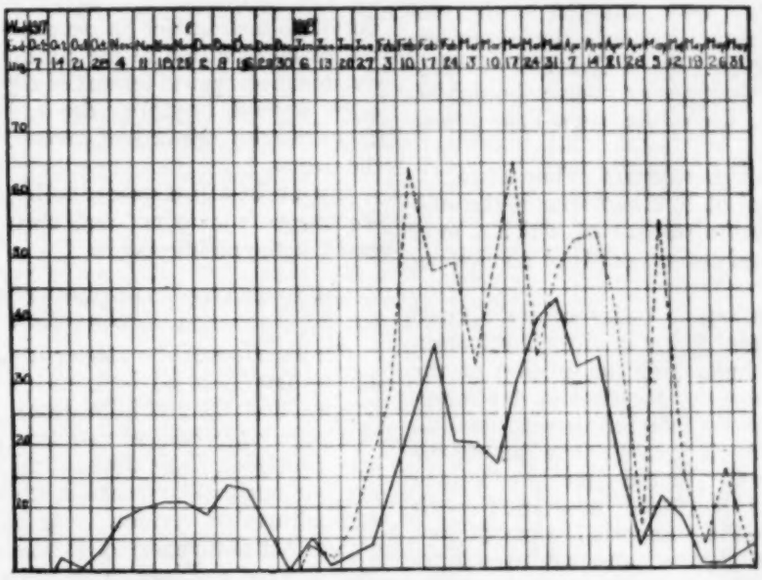

Chart 1.—Weekly occurrence of diphtheria and diphtheria carriers at Camp Doniphan: solid line, cases; broken line, carriers.

BACTERIOLOGIC DIAGNOSIS

To aid in establishing uniformity in diagnosis, we adopted Wesbrook's classification of *B. diphtheriae*. Those organisms showing the morphology of Wesbrook's Types A, A[1], B, B[1], C and D were considered as being positive. Those that did not show all the characteristics of these types were further incubated for from four to six hours in order to ascertain if they would assume those characteristics.

In the course of this study it was noted that diphtheroids were found more frequently when cultures made from the nose and throat were planted on the same tube. In all doubtful cases, when no definite decision could be made, cultures of the nose and throat were inoculated on separate tubes. In these cases it was frequently found that the throat cultures were negative while the nasal ones showed the presence of suspicious organisms.

No attempt was made to carry out virulence tests as a routine measure, since the large number of cases made it impracticable. In cases of doubtful morphology, and in those cases running a persistent positive course, virulence tests were carried out. Twelve cultures obtained from the nose, eleven from rib resection wounds, and nine from the throat were tested for virulence. Of this group of thirty-two cases, eleven cultures from the nose, two from the rib resection wounds, and nine from the throat were virulent for guinea-pigs. In order to conserve animals, the method advocated by Zingher and Soletsky[1] was used. The culture was isolated, transferred to tubes of Loeffler's blood serum, and, after from eighteen to twenty-four hours' incubation, the slant was washed off with sterile salt solution until a uniform dense emulsion was obtained. Of this emulsion from 0.1 to 0.2 c.c. was injected intracutaneously into a guinea-pig. At the end of from twenty-four to forty-eight hours an area of redness and induration developed at the site of inoculation which, in most instances, went on to necrosis in those animals showing positive reactions.

LOCALIZATION OF ORGANISMS

Every carrier was given a thorough examination in order to localize the affected area. After thorough cleansing of the mucosa, several cultures were made from the superior and inferior regions of each nostril and from each tonsil.

A positive culture from the throat does not necessarily imply that the carrier condition is located in this region, as the bacilli may be carried from the nose or nasopharynx by the inspired air or by the secretions. On the other hand, the bacilli may be carried from the throat to the nose by the expired air or the act of sneezing, and from the resulting positive nasal culture one might infer that the nasal passages were involved. No faith should be placed in a single negative culture, especially in those who have previously shown a positive culture. Conversely, the finding of a single positive culture is not sufficient evidence to justify the diagnosis of carrier, as this may be the prelude to an attack of clinical diphtheria that has not yet had time to manifest itself.

FOCI OF INFECTION

Tonsils.—The presence of a favorable soil for bacterial growth is a factor that determines the persistence

1. Zingher and Soletsky: Jour. Infect. Dis., 1915, **17**, 456.

of the carrier condition. If necrosis or ulceration of the epithelium covering the tonsils or lining the crypts is present, the bacilli may be found in the tissue beneath the diseased area. The size of the tonsil, per se, is not a factor as a predisposing cause in establishing the carrier condition. The degree to which the tonsil is covered, the extent of surface exposed, lobulation, and the presence of folds or crevices, all have a definite influence on infection of the tonsils by interfering with the evacuation of the crypts. In this study it has been demonstrated repeatedly that acute or chronic pus infections are often associated with diphtheria carrier conditions.

In order to ascertain the points of localization of *B. diphtheriae* in the tissues, cultures were made from the nose and throat immediately preceding tonsillectomy, and planted on separate tubes of Loeffler's medium. The excised tonsils were received in sterile Petri dishes and delivered to the laboratory. After removal of the surface blood and bacteria by means of sterile salt solution, a sterile swab was inserted deeply in the crypts and then inoculated on Loeffler's medium. From the tonsils found to be infected, almost pure cultures of *B. diphtheriae* were obtained in the vast majority of cases. In most instances the organisms displayed the morphology of Types C and D of Wesbrook's classification. About ten or twelve showed his Types B and B^1, while in five or six cases Type A was found.

In two cases studied, Lieutenant Thorne, M.C., demonstrated the presence of *B. diphtheriae* in the submucosa of a tonsil from the surface of which a pure culture had been previously obtained, thus confirming the work of others.

Nose.—The next location, in order of importance and frequency, is the nose. Acute or chronic infection of the accessory sinuses, ulceration or erosion of the septum or soft tissues, and the presence of dry secretions and gross abnormalities interfering with ventilation and drainage all furnish favorable conditions for the lodgment of the bacilli. In the chronic accessory sinus affections, especially those associated with marked atrophic changes, the prognosis is almost hopeless. It was impossible to discover any particular location within the nose that favored the growth of the bacteria. Washings from the sinuses invariably proved negative. The idea that the mucous glands were the definite points where the bacilli thrived was not substantiated. Tissues removed from the various regions of the nasal passages were sectioned and stained for the organism with results that were entirely negative. In spite of several failures to demonstrate the presence of the organisms, their general distribution throughout the nasal passages justifies the belief that, sooner or later, they will be found underneath the diseased mucous membrane and possibly in the ethmoid cells.

Nasopharynx.—The nasopharynx ranks third in order of frequency as a lodging place for *B. diphtheriae*.

This may be attributed to the presence of ulcerative or inflammatory processes, infections of the posterior ethmoid and sphenoid sinuses, and the presence of hypertrophied adenoid tissue. The size of the latter is not of etiologic significance, as a relatively small amount may harbor the bacilli as effectively as a large mass. The same difficulty has been met in finding the organism in the adenoid tissue that was encountered in the case of the nose.

Wounds.—Wounds may carry the bacilli for an extended period of time. An epidemic of wound diphtheria occurred in two wards occupied by patients who had rib resections for empyema. In one of these wards the diphtheria bacillus was first demonstrated in the wound of a head carrier; this occurred about the middle of March. Five more cases had developed by the end of the month, and twenty-eight occurred in April and ten in May, making a total of forty-four cases. In thirty-three of these cases, *B. diphtheriae* was found in the wound alone, while in twelve the organism occurred in both wound and throat. In thirteen cases the presence of a pseudomembrane and other characteristics of a diphtheric wound were noted. With few exceptions the organism was recovered from granulation tissue, while cultures taken from the depth of the wound were usually negative.

The virulence of the organism was proved by intracutaneous injections into guinea-pigs. In one of two cases thus studied, redness and induration at the site of inoculation was produced after twenty-four hours, and at the end of seventy-two hours local necrosis was well marked. The second pig died within seventy-two hours after an intracutaneous injection of 0.2 c.c. of an emulsion of the culture. At the postmortem examination typical lesions of diphtheria were found.

In several instances the organism was recovered from the skin which had covered over the opening into the chest.

Ears.—In a few cases the bacilli were found in the discharge from acute and chronic suppurative processes of the middle ear.

NONOPERATIVE TREATMENT OF THE CARRIER CONDITION

For the cure of the carrier condition many medicinal agents have been advised, such as sprays, applications, gargles, douches and inhalations. Other agents, acting in a purely mechanical manner (such as kaolin), have been proposed. At various times antitoxins, diphtheria vaccine, antibacillary serum, toxins of *B. pyocyaneus*, and cultures of various living bacteria have been recommended and reported on favorably. From experience derived previous to and during this epidemic, we feel that the value of any local treatment is particularly liable to be ineffective because of the fact that the bacilli are found in the depth of the crypts and beneath the epithelium and are, therefore, untouched by the remedial agent.

In nasal carriers the cessation of the carrier state takes place on the disappearance of the accompanying pathologic condition; therefore, efforts must be directed toward the improvement of the underlying condition.

In the most persistent carriers, local measures were without avail. Various kinds of solutions for irrigation, silver salts, dichloramin-T, crystal violet, and oily sprays were given a thorough trial. It was not difficult to obtain negative cultures while the treatment was being carried out, but when this treatment was discontinued the cultures were again returned positive, and, unless the patients were kept under careful control, it was quite easy to draw inaccurate conclusions regarding the effect of local measures. The harm, of course, results in the release of carriers who are still a menace to their comrades. It must not be construed from what has been written that the affected regions, especially the nose, should not be kept clean, since this is one of

the prerequisites for the restoration of the normal functions of the diseased area. At the same time the use of strong irrigating solutions should be carefully governed, for, if used in too great strength, the mucous membrane will be injured to a further degree.

When a wound is involved, it should be dressed frequently in order to keep it as clean and dry as possible, and all granulations should be removed.

OPERATIVE TREATMENT OF THE CARRIER CONDITION

Since local applications have proved unreliable in the treatment of the carrier state, it seems to us that operative interference is the only solution of the problem, especially in those cases in which the tonsils can definitely be shown to be the focus of infection. In 77.2 per cent. of carriers, the bacilli were harbored in the tonsils. The majority of the remainder showed the presence of *B. diphtheriae* in the nose.

The tonsils should be removed in every case in which it can be positively demonstrated that they are harboring the organism. The contraindications for tonsillectomy in carriers are those that apply under other circumstances.

The majority of patients with clinical diphtheria remain in the hospital for a period of approximately four weeks before they are returned to their commands. Since, in the average case, the bacilli have disappeared by the end of the third week, this may be taken arbitrarily as the beginning of the carrier stage. Consequently, it is safe to remove the tonsils at this time, provided there are no contraindications.

The reaction in carriers, following operation, does not differ from that found in noncarriers. Occasionally it may be severe enough to arouse suspicion that clinical diphtheria is present. However, unless there has been operative traumatism to the surrounding structures, the limitation of the postoperative exudate to the tonsillar fossae—in contrast to the angry red, edematous throat of diphtheria, in association with the marked prostration—suffices to differentiate the two conditions.

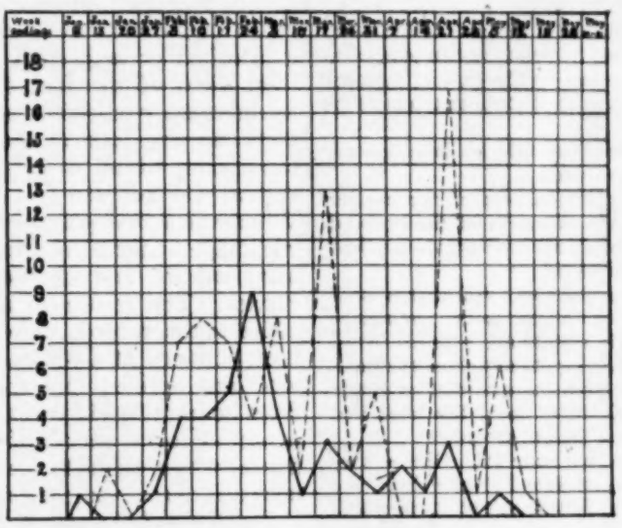

Chart 2.—Occurrence of diphtheria among the base hospital personnel: solid line, cases; broken line, carriers.

Patients on whom operations were performed had been positive for a period varying from one week to several months. As nearly as could be determined, the proportion of primary to secondary carriers was as 2:1. Of the 294 carriers operated on, 20 per cent. yielded a positive culture from the nose and 57 per cent. from the throat, immediately before operation. Subsequent to operation the following results were obtained:

Ninety-four, or 32 per cent., had no positive returns.

One hundred and thirty-six, or 46.4 per cent., were negative by the end of the first week.

Thirty-eight, or 12.9 per cent., were negative by the end of the second week.

Eleven, or 3.7 per cent., were negative by the end of the third week.

Fourteen, or 4.7 per cent., were negative by the end of from four to eight weeks.

One, or 0.3 per cent., was still positive at the end of four months despite all treatment.

In those cases found to be persistently positive, acute or chronic infections of one or more of the accessory sinuses, septal deformities with erosions, or infected adenoid tissues were present.

The time of clearing, as shown by the 91.3 per cent. who were negative by the end of the second week, corresponds very closely to the time required for healing. As the postoperative exudate disappears and the wound heals and becomes smooth, the lodging places of the bacilli become obliterated. In one carrier with adenoid involvement the bacilli disappeared after the tissue was removed. In the persistent nasal carriers, clearance coincided with improvement in local conditions. On the cessation of the infection in the acute sinus cases, the carrier condition terminated.

In the chronic cases, drainage and constant attention to cleanliness helped, but only after a considerable time. Patients with atrophic rhinitis presented the greatest difficulty as, even after the most continued and careful treatment, and the return of more than the required number of negatives, there was no assurance that the bacilli had finally disappeared. The advisability of operating on these patients was considered, but the extensive involvement of the nose and accessory sinuses, with the resulting marked disturbances of function and nutrition, all advised against this. In addition, there was no assurance that crusts would not continue to form and thus serve to maintain the original condition. The question naturally arises as to what should be done with this class of patients. Chronic infection of the accessory sinuses disqualifies for admission into the service. Nevertheless, there are many such cases in the Army at present. It may not be practicable to have the opinion of a specialist on each individual in the service, but, in our opinion, every one connected with a base hospital should have a thorough examination of the nose and throat. Remediable conditions should have early attention. Chronic nasal diseases that offer no hope of early improvement or cure may necessitate discharge from the Army.

The disposition of a chronic nasal carrier with virulent bacilli is a question that will require much consideration. It may be solved partly by employing these patients in diphtheria wards where there are cases of diphtheria in the hospital or camp. What should be done with them at other times is the point to be decided. At present the isolation camp is the only solution. It is impossible to state the length of time during which the carrier condition may persist. To illustrate, one case that occurred in civil practice may be cited. An infant became a carrier at the age of 2 months. The bacilli

continued to be found for 251 days. Virulence tests made shortly before the condition cleared were positive.

CONTRIBUTORY FACTORS IN THE MAINTENANCE AND SPREAD OF THE EPIDEMIC

Measures undertaken for the control of any communicable disease must begin at the source of infection and continue until all danger of infecting others has passed. The following factors may counteract any or all of the defensive measures that have been instituted against an epidemic:

A. Delayed or mistaken diagnosis. This may be seen especially in cases of primary laryngeal diphtheria, which may remain undiagnosed for several days.

B. Ambulatory cases, usually of a mild or nasopharyngeal type. This was illustrated by a case in which a man was admitted to the hospital with the history of an indefinite nasal complaint of nineteen days' duration. A diagnosis of nasal diphtheria was made, which was confirmed by the laboratory. Yet, during the entire period of his illness, the patient had been doing full duty with his regiment.

C. Contiguity. The spread of disease by droplet infection is facilitated by close association in tents, barracks, wards, wash rooms, kitchens and general mess halls.

D. Fomites. Dishes, kitchen utensils, the use of the pipe, drinking cup, canteen, or musical instruments in common, mouth pieces of gas masks, unwashed bed linen, and laundry must all be taken into consideration as distributing agents in an epidemic.

E. Food supply. The milk supply should be investigated, especially when raw milk is being used.

F. Lack of appreciation of the seriousness of the carrier problem on the part of some of the members of the hospital organization, comparatively few of whom have previously had any experience with contagious diseases.

G. Improper methods of taking cultures. Cultures should be taken carefully and not by the "hit or miss" method so often employed. The most reliable results are obtained when cultures are taken from the tonsillar crypts and from the nose. Wound cultures should be made from the granulation-tissue before the wound is dressed. Cultures from the nose and throat should be taken immediately before treatment.

H. False conclusions from defective material. Old or contaminated culture mediums may inhibit the growth of the diphtheria bacilli. The use for the Schick test of toxin which has deteriorated in potency may lead to erroneous conclusions as to the presence, in the body fluids, of sufficient antitoxin to protect the individual.

I. Release of patients from quarantine before negative cultures in sufficient number have been obtained, or before the necessary interval of time has elapsed.

J. Disregard of surgical principles in dressing wounds. Particular care should be taken that all gloves and instruments should be thoroughly sterilized for each case.

K. Lack of appreciation of the importance of carrying out quarantine regulations. The fact that the patient is needed by his organization or that there is a shortage of beds in the hospital should not be a sufficient cause for the premature release of a man from quarantine.

L. Undetected carriers. Individuals who have not been found positive by the laboratory, and patients with acute tonsillitis may be discovered to be carriers only when cultures are taken as a routine measure.

The causes for the maintenance or spread of an epidemic of diphtheria may be classified as avoidable and unavoidable. Inexperience, indifference, ignorance and carelessness are factors in the first group. Under unavoidable causes may be included legitimate errors in the diagnosis of atypical cases of diphtheria, clinically mild cases, carriers released after full compliance with the regulations, and, lastly, inadequate laboratory facilities.

CONTROL AND PREVENTION

The methods provided for the control of communicable diseases are so well known that a review would seem unnecessary. When the cases are few, the proposition may be simple; but when there are many to be dealt with and it is essential that company organization and the training of troops shall be maintained, the problem becomes more complex.

A. Centralization of control. For the attainment of efficiency and the accomplishment of results, centralized control is absolutely necessary, as division of responsibility tends toward weakness.

Clinical diphtheria is under the care of the hospital section of medicine. Suspect cases usually appear in the wards pertaining to head surgery. Nose and throat carriers may be found anywhere and are inherited by the latter service. Military or hospital exigencies may require frequent changes in attendants. Patients convalescent from diphtheria must be removed to make room for the acutely ill, and may be transferred to a convalescent camp. Since this may become overcrowded, the patients must in turn be moved to an isolation or quarantine camp. In the meantime, as a result of the conditions cited, cultures may have been overlooked or neglected.

In view of the fact that, in this series of cases, the laboratory passed on all cultures submitted and was therefore cognizant of the status, from a bacteriologic standpoint, of all cases of diphtheria, the following system was adopted for the control of the epidemic: Whenever a new positive culture was found, a record was made of the name, rank, organization, date of primary culture, and whether the patient was a case or carrier. The results of all subsequent cultures were added to this record. After three negative cultures had been obtained at three-day intervals, the chief of service was notified that the patient could be released from quarantine. In cases in which the positive returns persisted for a period of three weeks or longer, the matter was brought to the attention of the chief of the nose and throat service for further investigation.

B. Disposal of patients. Undoubted clinical cases of diphtheria were sent directly to the diphtheria wards by the receiving officer. All patients who were sent to the head surgery section were examined in the outpatient room before being admitted to the wards. Owing to the large number of acute inflammatory throat conditions admitted at this season, it was considered advisable to make cultures of every patient admitted to this service. Suspicious cases were isolated in private rooms. Separate wards were set aside for the reception of carriers. Known carriers from the camp or other wards were received there directly.

On account of the necessity of awaiting the laboratory report on cultures, the disposal of patients presented a problem. To meet this contingency, the following plan was evolved in conference with the commanding officer, the chief of the section of head surgery, and the chief of the laboratory: Five pyramidal tents, each having a capacity of four beds, were erected in the rear of the head surgery wards. All patients admitted to the service other than by transfer from other wards were examined, cultures were taken, and the patients were treated and then sent to the observation tents. On the return of the culture findings, patients with negative cultures were transferred to the clean wards, while those with positive cultures were

sent to the carrier or diphtheria wards, according to the laboratory findings. Since the information furnished from the return of a single negative culture was found to be insufficient, the patients who had been sent to the clean wards were isolated in cubicles and further cultures were taken. If found negative on the second culture, they were allowed the freedom of the wards, but if found positive they were transferred to a carrier ward. All patients presenting symptoms suggestive of clinical diphtheria, even though the cultures were negative, were kept isolated in the observation tents or, if quite ill, in private rooms in wards until a definite diagnosis was made.

From the middle of February to the latter part of May, 680 patients were sent from the receiving office to the head surgery section for all causes. Of this number 127 were found to be either diphtheria carriers or cases: of these, fourteen patients were sent at once to the diphtheria wards; sixty-one patients were sent from the observation tents to the diphtheria wards at a varying number of hours after admission; thirty-two patients were sent to the carrier wards. Twenty patients who were negative on the first culture and who had been isolated in clean wards gave positive returns on the second culture. The extent of the epidemic may be readily appreciated when it is noted that 18.6 per cent. of all cases that passed through the head surgery section were either carriers or cases of diphtheria.

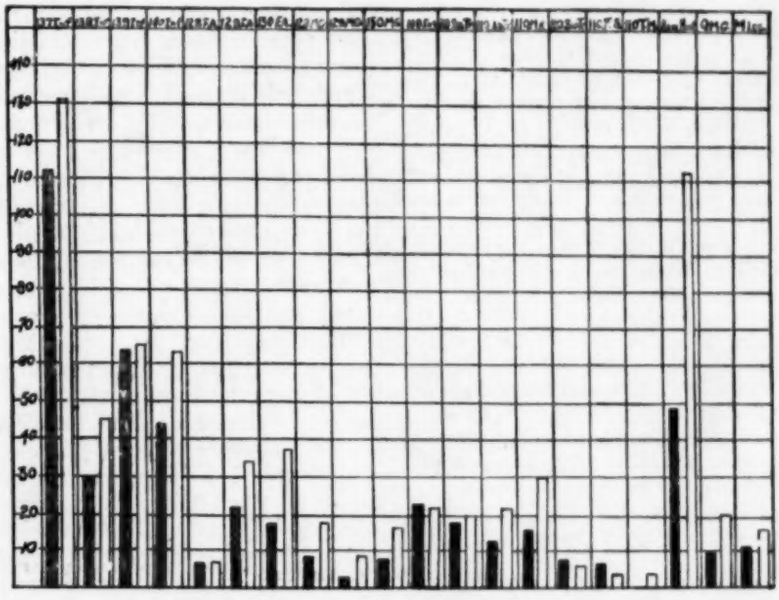

Chart 3.—Incidence by organizations of diphtheria and diphtheria carriers at Camp Domiphan, Oct. 1, 1917-June 1, 1918: solid blocks, cases; outline, carriers.

Routine cultures were taken, at five to seven day intervals, of the personnel and patients. The system of cubicle isolation and the establishment of carrier wards was soon extended to the other wards of the hospital.

C. Masks. The protection afforded by masks may be real or imaginary. The simple gauze bandage is the poorest of all, since when worn by patients it may be found in any position between the chin and the forehead. The mouth and nose are rarely covered at the same time. The combined head and face (helmet) mask, if made of a material with a close mesh, is the most efficient and may be worn for some time with comparatively little discomfort. The thick gauze surgical mask which fits the mouth and nose closely is uncomfortable for continuous wear and, owing to the condensation of moisture on it, becomes unsightly. A mask that was found suitable for clinic work and ward visits was made of a copper wire frame covered with several layers of gauze held in place by small strips of adhesive plaster or by basting thread. It was similar in appearance to an anesthetic mask. The frame was bent to fit the nose and mouth closely. Tapes or paper clips that held a rubber band were attached to the sides of the mask, and by the slipping of these bands over the ears the mask was securely held in place. Its chief advantages consisted in the rapidity with which it could be adjusted or removed, and the absence of the discomfort that is found with all close-fitting masks. Conversation was not interfered with, which was also advantageous when clinical instruction was being given.

Despite regulations regarding the wearing of masks, it is very difficult to obtain complete observance with ambulatory patients and even with attendants. Sharp disciplinary measures are necessary to enforce compliance with the rules.

D. The Schick test. There is very little doubt that the Schick reaction, by determining the susceptibility of individuals to diphtheria, is of great value as an aid in controlling the spread of the disease. Of 1,035 Schick tests performed, eighty-eight (8.5 per cent.) were positive, while 947 (91.5 per cent.) were negative. Of the eighty-eight persons who yielded a positive reaction, fifteen developed diphtheria, while among those who showed a negative reaction only three contracted the disease. All carriers tested gave a negative Schick.

Faulty results will be obtained if the toxin used is not of the proper potency. This was demonstrated in the case of the three men who developed diphtheria after a negative Schick, for, on further investigation, it was found that this particular lot of toxin had deteriorated.

E. Toxin-antitoxin. That diphtheria antitoxin confers but a transient immunity is well known. This fact is further corroborated by our own observation of a group of men, a number of whom manifested a positive Schick reaction within from three to four weeks after the administration of immunizing doses of antitoxin.

Within the past four months fifty-eight Schick-positive individuals have been injected with three doses of a toxin-antitoxin mixture prepared by the New York Board of Health. As these men have been transferred from this station we have been unable to carry out further tests in order to ascertain whether or not they have developed an active immunity.

We appreciate the fact that the injection of toxin-antitoxin will not give rise to immunity until after three or four months and is, therefore, of but little value in an epidemic. We are aware, moreover, that the administration of immunizing doses of antitoxin to susceptible individuals during the epidemic, though they protect the patients for the time being, may, on the other hand, so sensitize them as to make further

introduction of serum dangerous, since it may give rise to anaphylactic shock. Nevertheless, these measures are of decided value and should be employed.

F. Hospital rules for the control of the epidemic. To supplement or amplify the rules concerning communicable diseases as prescribed by the Office of the Surgeon-General, the following additional rules were promulgated as occasion demanded

1. Cultures will be taken from the nose and throat of all patients, ward attendants, and detachment personnel other than those employed in the wards, every seven days.

2. The receiving officer or officer of the day will have cultures taken from the nose and throat of all patients admitted to the hospital and will note that fact on the admission slip. If patients are too ill to have cultures taken in the receiving ward, cultures will be promptly taken by the ward officer.

3. It is directed that cultures from new cases entering the hospital be designated by writing across the request blank, "Field case," "For diagnosis," "Carrier" or "Release," as the case may be.

4. Masks will be worn by all members of the staff in all wards and by the patients in the diphtheria and carrier wards. The nose must be kept covered as well as the mouth.

5. Except in emergency, new personnel must show a negative culture and a negative Schick test before assignment to ward duty.

6. Nurses who are infected (patients and carriers) will be isolated in separate wards. Carriers will remain on duty but will be assigned to diphtheria wards only.

7. No contact will be permitted between patients from different wards. To insure this at meal times, all patients will be messed in their wards and no meals will be served in the mess hall.

8. Articles used in serving food (dishes, knives, forks, etc.) will be cleansed in the wards and then sent to the kitchen to be sterilized by boiling.

9. Visiting in carrier wards is forbidden.

10. Symptoms of sore throat in any member of the hospital organization will be immediately reported to the next higher authority. Cultures will be made at once and the individual isolated until the result is known.

11. Patients in clean wards who are found to be positive are to be transferred to carrier wards at once, and cultures are to be made of patients remaining in the clean wards.

12. Cultures of carriers are to be made daily until a negative is secured. Thereafter they are to be made every third day.

13. New patients in clean wards are to be isolated in cubicles and will not be allowed the freedom of the ward or latrine. A culture will be taken on the day of admission and on the following day.

14. Cases and carriers will not be released until notification of release from quarantine is received from the laboratory.

15. Cultures will be taken of patients received in the ward, by transfer from another ward, and these patients will be isolated until the results of the cultures are reported from the laboratory, unless cultures have been taken within three days prior to transfer.

16. All medical officers, nurses and enlisted attendants are to have a Schick test, and when this is found positive, toxin-antitoxin is to be administered for the purpose of immunization.

17. After discharge from the hospital, carriers and patients are to report once a week for culture of nose and throat for such a time as is deemed advisable.

EPIDEMIOLOGIC STUDY OF DIPHTHERIA

Chronologic Occurrence of Diphtheria.—That diphtheria is a disease of winter is well shown in Chart 1, since its incidence is much higher during the coldest months. Unfortunately, no differentiation was made between the cultures obtained from clinical cases and from carriers prior to January, 1918, but after that date all cultures submitted to the laboratory were designated as from clinical cases or otherwise. Almost perfect parallelism is seen to exist in this chart between the number of carriers and clinical cases. The great increase in the number of carriers over cases for the week ending May 5 was especially notable in the three organizations in which the greatest number of clinical cases for that week developed.

Occurrence of Diphtheria Among Hospital Personnel.—Examination of Chart 2, showing the occurrence of diphtheria and carriers among the hospital personnel, does not reveal the close parallelism that is seen to exist in Chart 1, since the number of carriers greatly exceeds the number of cases, except during the onset of the hospital epidemic, which occurred during the month of February. This is explained by the fact that the hospital attendants who were susceptible to diphtheria contracted the disease during the early part of the epidemic while, later, the constant exposure of those who were immune increased the proportion of carriers. It is of interest to note that a decided increase in the number of cases of diphtheria in the camp is followed, within a few days, by a similar increase in the number of cases among the hospital personnel. This may be noted by contrasting Charts 1 and 2 for the weeks ending February 17 and 24, March 31, and April 7, 14 and 21. This may naturally be attributed to the fact that the members of the base hospital received their infection from the patients admitted from the camp, and, since a period of incubation must elapse from the time of exposure to the time of the manifestation of the disease, the apex of the curve in Chart 2 would necessarily lag behind that of Chart 1.

Another source of infection, aside from the camp cases, was found within the hospital itself. On examination, the fact was revealed that approximately twenty carriers and patients were working in the detachment and hospital messes as cooks or cooks' police. Since the ambulatory patients from all clean wards congregated here for their meals, they were naturally subject to exposure to diphtheria. Corroborative evidence that this was a source of infection was adduced by the fact that the highest incidence of carriers and cases occurred in Hospital Barracks A and B, where most of the kitchen force was quartered.

Occurrence by Organizations.—On examination of Table 2 we find that organizations coming from rural communities have distinctly higher incidences of diphtheria than those coming from the cities. Thus a comparison of the four regiments of infantry, all having approximately the same strength and living under the same conditions, reveals the fact that the 137th and 139th infantries, coming from rural communities, have a higher percentage of cases and carriers than the 138th and 140th, coming from St. Louis and Kansas City, respectively. The same distinct difference may be seen to exist among the regiments of artillery, which were of like strength and lived adjacent to each other under similar conditions.

An apparent discrepancy in this statement may be found in the percentage of carriers and cases occurring among the base hospital personnel, which had a strength of approximately 500. This fact may be attributed, as has been mentioned in the discussion of Charts 1 and 2, to their continual exposure to the disease.

It is of more than passing interest to note that, in the study of empyema made during the past winter, those organizations that exhibited a high morbidity for

empyema showed, in this survey, a high incidence of diphtheria. From these facts one must conclude that, as has already been shown by others, a man from a rural community is not as great an asset to his organization in the early part of his military career as is an urban individual.

CONCLUSIONS

1. A single negative culture is only of relative value, as is shown by the fact that preoperative cultures, taken from tonsils that later proved positive for diphtheria, were negative in 22.8 per cent. of the cases.

2. The importance of nasal cultures is shown by the fact that in routine cultures taken from carriers, 26 per cent. were positive from the nose.

3. Cultures from chronic carriers should be tested for virulence.

4. The carrier state is maintained by some underlying pathologic condition of the affected tissues.

5. In the great majority of cases the carriers harbor the bacilli in the tonsils; a few carry the germs in the nose only; a small group maintains the infection in both nose and tonsils.

6. Conclusions based on the results of local treatment should be founded on careful and prolonged bacteriologic study. Cultures should be taken immediately before treatment, or, if local treatment is being administered, this should be suspended for a number of days before cultures are taken. The results of local treatment are problematical, since the organisms are situated deeply in the tissues.

TABLE 2.—OCCURRENCE OF DIPHTHERIA BY ORGANIZATIONS

Organization	Source	Carriers Per Cent.	Cases Per Cent.
137th Infantry	Rural	19.1	24.2
138th Infantry	Urban	6.7	6.6
139th Infantry	Rural	9.7	13.9
140th Infantry	Rural and urban	9.2	9.3
128th Field Artillery	Urban	1.3	1.8
129th Field Artillery	Rural and urban	5.1	4.6
130th Field Artillery	Rural	5.3	3.9
128th Machine Gun Battalion	Rural	2.7	1.8
129th Machine Gun Battalion	Rural	1.3	0.4
130th Machine Gun Battalion	Rural	2.3	1.7
110th Engineers	Rural and urban	3.0	4.9
110th Sanitary Train	Rural	3.0	3.6
110th Ammunition Train	Rural and urban	3.0	2.8
110th Military Police	Rural	4.3	3.2
110th Supply Train	Urban	1.0	1.1
110th Field Signal Battalion	Rural	0.4	1.3
110th Trench Mortar Battalion	Rural	0.4	0.0
Base Hospital	Rural and urban	16.7	10.6
Quartermaster	Rural and urban	3.2	2.1
Miscellaneous	Rural and urban	2.3	2.2

7. In persistent carriers in whom the focus of infection is the tonsil, enucleation offers the only certain procedure for terminating the carrier state.

8. The most persistent nasal carriers are those in whom chronic inflammatory or atrophic processes are found. It is almost impossible, in view of the varying culture returns, to state when the condition has finally cleared.

9. Centralization of authority is necessary for the control of an epidemic of diphtheria and diphtheria carriers in camp. Release of patients from quarantine should be under the supervision of the laboratory.

10. During an epidemic, patients should not be admitted to a clean ward unless they have had at least two successive negative cultures from the nose and throat.

11. Improperly constructed and improperly worn masks give a sense of false security.

12. The hospital personnel should be given a Schick test, and those giving a positive reaction should be immunized with toxin-antitoxin mixture.

13. Toxin for the Schick test should be prepared fresh, and no diluted toxin should be used after twenty-four hours. The undiluted toxin should be kept in the dark and in a refrigerator.

14. Intermittent chronic carriers should be employed as attendants in diphtheria wards or in quarantine camps. They should be separated from the hospital personnel and from their organizations.

15. Diphtheria patients may be discharged from the hospital after they have had at least three negative cultures at three-day intervals. Chronic carriers should not be discharged until cultures taken over a long period of time prove consistently negative.

We take this opportunity of expressing our appreciation for the cooperation accorded us during this study to the following members of the staff of the base hospital: Major A. C. Magruder, Capts. W. B. Post, E. E. Hopkins, A. W. Cox, H. E. Blanchard, R. Appleberry and A. E. Edgerton, Lieut. F. H. Thorne, Miss Marjorie Bates, Miss Dorothy Loomis, and Pvt., First Class, Stephens Moore.

THE PROTECTIVE QUALITIES OF THE GAUZE FACE MASK

EXPERIMENTAL STUDIES

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The use of the face mask by surgeons and their assistants to protect clean operative fields which they otherwise would spray with their own mouth organisms at every cough or sneeze is an old and well established procedure. The utilization of the face mask to protect the wearer from droplet infection in the presence of those ill with acute infectious diseases is likewise now a well established custom owing in large part to the careful studies at the Durand Hospital in Chicago. Weaver[1] has shown its efficacy when used in this institution in protecting attendants on infectious disease cases both from contracting these diseases and from becoming carriers of them. Capps[2] has published statistics tending to confirm the work of Weaver and has proposed a new adaptation for the face mask, the essential idea being to use this mask to protect patients from cross-infection in the ambulances, and in the admission rooms and wards of the hospital. The clinical results of this adaptation of the face mask were described by Capps[3] recently.

The work described in this paper was carried out for several reasons. The masks used at this hospital have come from several different sources. Masks found in use in the various wards on the same day showed extreme variation in the number of layers of gauze. Some were made with only three layers, and were obviously too thin. Others were made with eight layers, and these were quite hard to breathe through; also they were very warm and uncomfortable. The gauze of which the masks were made varied in quality,

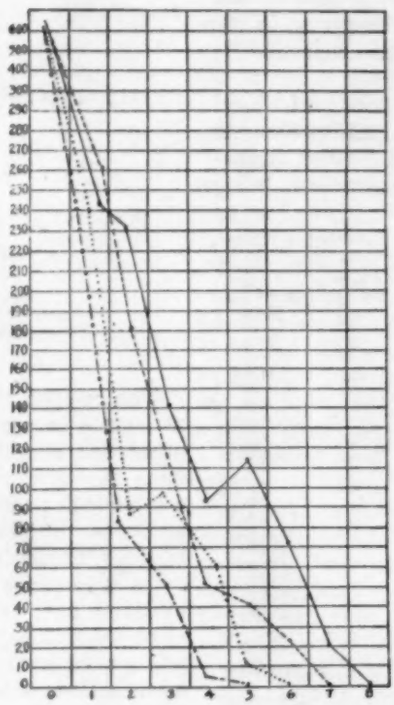
1. Weaver, G. H.: The Value of the Face Mask and Other Measures, THE JOURNAL A. M. A., Jan. 12, 1918, p. 26.
2. Capps, J. A.: A New Adaptation of the Fase Mask in Control of Contagious Diseases, THE JOURNAL A. M. A., March 30, 1918, p. 910.
3. Capps, J. A.: Measures for the Prevention and Control of Respiratory Infections in Military Camps, THE JOURNAL A. M. A., Aug. 10, 1918, p. 448.

some being as fine as twenty-eight strands to the warp and twenty-four to the woof per inch. Other specimens showed twenty strands to the warp and fourteen to the woof per inch. The masks varied in size. Some we believed to be too small. A great difference was noted in the same mask before and after being washed. In addition to this variation in the masks, we judged that there was some difference between the protection afforded the uninfected individual by a mask when placed over the mouth and nose of the one infected and when an identical mask was placed over the mouth and nose of the uninfected, for the reason that in the latter situation the mask is at a greater distance from the source of the organisms, and they are not propelled against the mask with the force that they are when it is directly subjected to currents of air expelled from the mouth carrying numerous droplets of mucus and saliva, each one of which probably carries many organisms.

One of us was found to be a badly infected carrier of typical pneumococci (Type IV) which could be distinguished on human blood agar plates from air-borne organisms of the room which were deposited on plates of the same mediums exposed at the same time in the same room. It was determined to have this individual cough directly at a Petri dish containing this medium, first without a mask and later with masks over the face, each succeeding mask being thicker by one layer than the preceding one. Masks tested varied in thickness from one to eight layers. The gauze used was Bauer and Black's or the equivalent of their specimens called, (1) B and B (32 by 26); (2) L and L (28 by 24); (3) Lakeside (24 by 20); (4) Dearborn (20 by 14).

The coughing was kept as nearly constant as possible, both in force and in the number of coughs. It was soon found that the first few coughs were usually rather unproductive and that it was necessary to have the individual cough several minutes before the coughs became roughly equal in productiveness. The Petri dishes were in every case at a distance of from 12 to 14 inches from the face. The gauze was unwashed and was sterilized in the steam autoclave at 15 pounds pressure for thirty-nine minutes and then allowed to dry before being used. A chart of the protocol of an experiment is given herewith. It will be noticed that if one takes the sum of the strands counted in the warp and in the woof in the case of each quality of gauze—B and B, 32 and 26, total 58; L and L, 28 and 24, total 52; Lakeside, 24 and 20, total 44; Dearborn, 20 and 14, total 34—and multiplies in each case by the number of layers of gauze necessary in each case to protect fully the exposed plate, these figures quite closely correspond: $5 \times 58 = 290$; $6 \times 52 = 312$; $7 \times 44 = 308$; $9 \times 34 = 306$.

The total number of colonies coughed through various layers of gauze cannot be compared directly with the total number of colonies coughed through one of the same series of masks resterilized and used at some other time, for the contamination of the mouth is not at all the same at different times. A complete series of masks must be run through at one sitting. This is done on several different occasions and the results for each mask averaged. The results with two or more patients can be compared only by taking the number of colonies on the respective control plates as a total and expressing all other counts in percentages of this total. The percentages can then be directly compared. The only constant feature in regard to the various masks seems to be the thickness at which absolute protection of the place is reached. This can be tested with very little trouble and without going through the entire series of masks. The conclusion reached is that the amount of gauze placed in superimposed layers necessary to give fully complete protection when the mask is worn over the face of the one infected lies very close to the equivalent of 300 strands of cotton fiber to the square inch.



Experiment with gauze over face: line of dots and dashes, B and B (32 by 26); dotted line, L and L (28 by 24); broken line, Lakeside (24 by 20); solid line, Dearborn (20 by 14).

In several instances the experiment was conducted as described, and in addition after each mask had been worn from five to fifteen minutes another Petri dish was then exposed and coughed at in the same manner. The object was to see whether the filtration was as efficient after the mask had been worn for some time as it was when first put on. The workers were biased in their belief that the mask would not be sufficient, and quite a large number of parallel and control experiments were necessary to remove this bias. It was, however, conclusively shown that no more organisms penetrate the mask after it has been worn for thirty minutes than when it is first applied to the face, provided, of course, all other factors remain constant. The mask if dried and reversed will become not a filter but a disseminator of organisms. Experiments to determine the effect of drying used masks which are then reapplied to the face have been so at variance with each other as to be quite inconclusive. It is our opinion, however, that this drying process is rendered practically harmless when the mask is reapplied without reversal after the patient has breathed through the mask several times and the expired air has been allowed to moisten it again. It seems that the practice as followed here of marking the face side of the mask by a small strand of black thread is a very good one and should be followed out in all masks.

Our second series of experiments was directed toward a determination of how many superimposed layers of gauze are necessary to protect when applied over the face of the uninfected, rather than over the mouth of the infected. To represent the recipient, a Petri dish was masked and coughed at from a distance of from 12 to 14 inches with no mask over the face of the subject. One feature entirely neglected in this experiment which is present in the actual clinical test

of the mask is the inspiratory suction through the mask. The same series of masks were used although only one quality of gauze was completely worked out. This was the Lakeside (24 by 20). Five layers were necessary to protect the plate completely, which amount represents 220 strands of cotton fiber to the square inch.

A third series of tests were made with duplicate masks; one was placed over the face and one over the exposed plate, each succeeding mask being increased in thickness by one layer of gauze. The series embraces all thicknesses from one to eight. The gauze used for the series was Lakeside (24 by 20). The figures obtained tend to show that cotton fibers in superimposed layers of gauze to the extent of 350 to the square inch equally divided between the infected and uninfected will prevent droplet infection. This result may be interpreted as inconsistent with the figures of the protocol given. This apparent inconsistency is, we believe, quite within the limit of error of the methods used. It can be shown that the mask over the face of the infected is of value in the prevention of the uninfected when used in addition to the mask over the plate which represents the uninfected.

Experiments made with washed gauze demonstrated the following facts: The better qualities of gauze B and B (32 by 26), L and L (28 by 24) and Lakeside (24 by 20) become more efficient through shrinkage of the fiber, and if too thick at the outset become almost unbearable after repeated washing. Here also there is some question whether or not most of the respiratory exchange takes place about the edges of the mask, rather than through it. With the very poor quality of gauze, Dearborn (20 by 14), there is a decided tendency for the gauze to pull apart and leave very large gaps in the individual layers. We are of the opinion that this gauze should never be used for this purpose.

Work with the reknit gauze has demonstrated that it is almost impossible, because of its remarkable stretching, to estimate its efficiency. Even under ordinary conditions it does not remain the same for more than a few minutes at a time. We hesitate to recommend its use, as we have seen a thick mask so stretched out and thinned after an hour's wear that it was quite obviously useless.

A small amount of work was done with Turkish toweling. Preliminary experiments tend to show that one layer of this material makes a highly efficient droplet filter, and it is comfortable to wear. The question of expense, and also the question of the effect of wear on this material, are to be considered.

SUGGESTIONS FOR MASKS

1. It is our belief that gauze of the quality of Lakeside (24 by 20) or L and L (28 by 24) should be used in four layers, B and B (32 by 26) in three layers, provided all persons are masked. In case only the infected are masked, Lakeside (24 by 20) should be seven layers thick, L and L (26 by 24) six layers, and B and B (32 by 26) five layers. If the masks of this thickness are used, the ambulances and receiving offices and particularly the clothing of uninfected patients would probably not become infected.

2. Masks should be 8 inches in length with the edges turned in and stitched. They should be 5 inches in width.

3. Two braids should be used, each 1 yard long and sewed along the upper and lower borders of the mask so as to leave a free end 14 inches long at each side.

4. The masks should be marked on the face side by a black thread tied in the gauze.

THE ARMY SHOE AND MILD FOOT DISABILITIES

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Extensive foot inspections were made of the soldiers who were trained during the latter half of 1917 and early part of 1918. These inspections were first made when the men were inducted into service and while the feet still showed the abnormal conditions that were present in civil life, and again before they were sent overseas. Comparison of the results of the two examinations disclosed that marked changes had occurred, and the experience of civil orthopedic practice is verified by these observations. These changes have been almost uniformly favorable to better function of the feet, and when unfavorable results have occurred, the reason has been readily traced.

In endeavoring to account for the marked changes observed, there are two factors that stand out as most potent. First is the Army shoe and second is the increased personal care and interest in foot health on the part of the officers and men from the instruction by the orthopedic surgeons.

Extensive observation (covering several hundred thousasd cases) shows that 98 per cent. of the recruits can be fitted with the Army shoe. This fact alone is the strongest possible recommendation for its use, but an additional fact still more strongly recommends it. This is the beneficial influence of the shoe on the foot of the wearer. When a shoe is properly fitted at the beginning of service, there should be about two-thirds inch between the end of the longest toe and the end of the shoe. After from four to six months of training there should be at least half an inch. The heel should be held fairly snug in the shoe, the vamp should fit smoothly over the forefoot, and the ball of the foot should rest in its seat near the posterior turn of the sole. In fitting shoes, it must always be remembered that a shoe will enlarge sidewise but never lengthwise. Also, that repairing tends to shorten a shoe, and rebuilding actually does shorten it.

Short shoes cause more foot troubles than narrow ones; hence the great need of the two-thirds inch room in the length of the shoe to accommodate the lengthening of the foot in the first four or five months of training. This length and breadth of shoe permits a degree of function hitherto unknown to the foot. There is greater freedom of toe action, which affects both muscles and joints. This is followed directly by lengthening of ligaments, increase in size of muscles and alteration of relations of all the anatomic elements of the foot. These factors contribute directly to an increase in the size of the part. I have repeatedly seen cases in which the original size of the shoe had been strongly objected to as being entirely too large, but after a few months of intensive training and perhaps using extra or thicker socks, the fit was entirely satisfactory by reason of the development of the foot.

With the greater freedom of action in the larger shoe, there occurs absence of pressure on toe-joints, and corns disappear. There is freedom from pressure on nails, and "ingrowing" gradually ceases, especially if a little aid is given by proper cutting and attention. Toes that have been crowded together have sufficient room for normal function, and under the constant muscle pull and better distribution of weight, both of which forces are almost constantly active in the soldier's foot for from twelve to fourteen hours a day, they gradually assume a normal relation. In many instances, a moderate degree of overlapping has gradually lessened to a very nearly normal position. Similar results obtain in various other conditions in which secondary pathologic changes have not produced a degree of permanence that will yield only to surgery. These superficial conditions are always of mechanical origin, and almost universally from improper foot coverings, not from faulty function primarily. When, therefore, these mechanical conditions are remedied or removed, the effects disappear and the part gradually develops into as nearly normal a state as is compatible with existing pathologic changes or conditions.

As the result of greater freedom of action, the intrinsic muscles of the foot, which have long been

Foot resting on the two sides of a concave inner sole, without support to the transverse arch.

inactive and atrophied, gradually resume again their function. This chiefly concerns the maintenance of the transverse and longitudinal arches. With increase in activity, there is also increase in size. The foot develops power and endurance. The fibrous attachments strengthen to meet the greater strain. Circulation improves by reason of the greater functional activity and the lessening of constriction. This promotes nutrition and a beneficial circle is established to replace the former vicious one. Greater elasticity and increased range of motion in the various joints of the foot allow a greater variation in its length from changing function and strain. The tonicity of the large leg muscles also improves and the support essential to weight-bearing and progression is readily developed. This in turn gives a better position to the foot so far as concerns the carrying of the body weight, and the onset of static disability is prevented.

One other very striking result from the wearing of the properly fitted shoe is in troubles with the transverse or metatarsal arch. Foot inspection shows a large number of men with callosities under the metatarsal heads (ball of the foot). This means a loss of the transverse arch, and may be associated with metatarsalgia (Morton's foot) or with painful callous areas or both.

The preservation of the transverse arch depends mostly on the strength of the intrinsic foot muscles and the vicious circle following the wearing of improper shoes is readily succeeded by sagging and loss of this arch. Furthermore, in the manufacture of a shoe, the inner sole is likely to be concave instead of convex. This is due to the fact that the sole of the last is convex; hence, as the leather is fitted over it, the result is a concave surface inside. The foot then rests on the two sides of this and has no support in the center, as in the accompanying illustration. If now the muscles that furnish support are weak and atrophied, severe use will almost surely result in loss of the foot arch (transverse) before sufficient power can be restored to them.

From the foregoing will be readily seen the great need of proper fitting of the shoes to maintain the best health of the feet. The regulation army shoe has all the essential qualities for foot health and is proving its worth to the soldier. The educational phase of the problem on the soldier is an equally great one, and its influence will persist for a long period after the war ends. The soldier will be a center for education in proper foot wear by reason of his comfort in shoes that are long enough and which conform to the shape of the foot.

FACE MASKS IN INFECTIONS OF THE RESPIRATORY TRACT*

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The use of face masks by those whose duties necessitate their coming in contact with cases of respiratory infection has now become general. The object of such masks is twofold: first, to protect the wearer against infectious material from the respiratory passages of the patient, and second, to protect the patient from such material as the attendant may himself carry in his mouth and nose. The types of masks worn, however, have been variable, and the efficiency of many of these types as barriers to the transmission of bacteria is certainly open to question. We have therefore undertaken experiments with some of the commoner types of masks in order to prove their efficiency or nonefficiency in preventing the dissemination of infectious material from the mouth during the acts of speaking or coughing.

Our first object was to determine, by means of agar plates exposed at different distances from an observer, how far infectious material might be projected from the mouth during speaking or coughing.

Our second object was to determine to what degree the wearing of a mask modified the projection of such material during the same acts.

METHODS AND TECHNIC

B. prodigiosus was selected as a suitable organism to introduce into the mouth for these experiments, because of its innocuous character, and because its pigment formation makes its recognition easy on agar plates.

For our experiments two small rooms were selected which were used for no other purpose during this time. Each of these rooms contained a metal topped table

*From the Hospital of the Rockefeller Institute for Medical Research.

and a chair. The arrangement of the furniture is shown in Figure 1. When the observer was seated in the chair, the table top was just below his ensiform. Agar plates exposed on the surface of the tables before the beginning of the experiments showed no *B. prodigiosus* present in the circulating air and dust.

EXPERIMENT 1.—*To determine the limits of projection of B. prodigiosus from the mouth during ordinary speech, loud speech and coughing.*—The observer first thoroughly rinsed his mouth and gargled his throat with a suspension of *B. prodigiosus* in 0.85 per cent. sodium chlorid solution, the viability of which was proved by subcultures at suitable intervals. The observer then entered the room and seated himself in the chair, facing down the length of the table. In line with the observer's mouth, agar plates were exposed from 1 to 6 feet distant, except in some of the coughing experiments, when plates were exposed up to a distance of 10 feet.

The observer then proceeded: (1) to talk in an ordinary conversational tone for five minutes; or (2) to talk in a loud tone for five minutes; or (3) to cough as much as possible for five minutes. In one instance ordinary conversational speech was maintained for a period of thirty minutes. At the conclusion of his speaking or coughing, the observer left the room. In order to allow the droplets in the air, if present, to settle on the surface of the plates, the plates remained exposed an additional ten minutes after the period of speaking or coughing. The colonies occurring on the plates were counted and recorded after seventy-two hours' incubation at room temperature.

Agar plates were exposed for one hour in the rooms between different stages of this experiment. By this means we found that an eight hour interval between the periods of talking or coughing was sufficient to insure the absence of *B. prodigiosus* in the circulating air.

The results of the projection of *B. prodigiosus* from the uncovered mouth during ordinary conversational speech, loud speech, and coughing, are shown in Table 1. The experiments were paralleled by two observers working in separate rooms.

TABLE 1.—PROJECTION OF B. PRODIGIOSUS FROM THE MOUTH ON AGAR PLATES DURING CONVERSATIONAL SPEECH, LOUD SPEECH, AND COUGHING *

	Distance of Plates from Operator in Feet									
	1	2	3	4	5	6	7	8	9	10
Speaking in ordinary conversational tone for 5 minutes	**1**	**0**	**0**	**0**	**0**	**0**	—	—	—	—
	0	**0**	**0**	**0**	**0**	**0**	—	—	—	—
	0	**1**	**0**	**0**	**0**	**0**	—	—	—	—
	13	**2**	**0**	**0**	**0**	**0**	—	—	—	—
Speaking in ordinary conversational tone for 30 minutes	**16**	**0**	**0**	**0**	**0**	**0**	—	—	—	—
Speaking in loud tone for 5 minutes	**72**	**0**	**0**	**0**	**0**	**0**	—	—	—	—
	49	**3**	**2**	**0**	**0**	**0**	—	—	—	—
	0	**0**	**0**	**0**	**0**	**0**	—	—	—	—
	115	**5**	**5**	**1**	**0**	**0**	—	—	—	—
Coughing for 5 minutes	**397**	**331**	**245**	**76**	**28**	**4**	—	—	—	—
	—	—	—	**248**	**116**	**94**	**32**	**13**	**17**	**6**
	242	**64**	**19**	**5**	**3**	**1**	—	—	—	—
	—	—	**4**	**6**	**3**	**1**	**2**	**0**	**0**	**0**

* Number of colonies of B. prodigiosus on each plate in boldface figures; dash indicates plates not exposed.

SUMMARY OF TABLE 1

1. *Ordinary Conversational Speech for Five Minutes.*—In three out of four trials, *B. prodigiosus* was recovered in small numbers on plates 1 or 2 feet distant, but no farther.

2. *Ordinary Conversational Speech for Thirty Minutes.*—One trial. *B. prodigiosus* was recovered only on the 1 foot plate in slightly larger numbers than in any of the preceding experiments.

3. *Loud Speech for Five Minutes.*—In three out of four trials, *B. prodigiosus* was recovered in moderate numbers on plates from 1 to 4 feet distant.

4. *Coughing for Five Minutes.*—In all of four trials, *B. prodigiosus* was recovered, usually in large numbers, on plates up to 6 feet distant.

In two trials in which plates were exposed up to 10 feet, *B. prodigiosus* was once recovered up to 7 feet, and once up to 10 feet.

MASKS

For the subsequent experiments, masks were used. The masks employed by us were of uniform construction, but differed in the nature of the material used and in thickness.

Three sorts of material were employed: (1) coarse gauze; (2) medium gauze, and (3) buttercloth (Fig. 2). From each sort masks were made of from two to ten layers in thickness.

Each mask was about 6 by 8 inches, hemmed on the edges, and made with four plaits on each lateral edge. The mask was equipped with tapes on the four corners by which to tie it behind the head (Fig. 3). When extended to the full width by a fanlike extension of the plaits, the mask presented sufficient surface to cover nose and mouth, and to come below the chin (Fig. 4).

EXPERIMENT 2.—*To determine the effect of a coarse gauze mask on the projection of B. prodigiosus from the mouth during ordinary speech, loud speech, and coughing.*—The methods and technic of this experiment were the same as in Experiment 1, except that during talking or coughing a coarse gauze mask was worn. Each of the experiments of speaking in an ordinary tone, speaking in a loud tone, and coughing, was done with each mask of from two to ten thicknesses of gauze. The results of these experiments are shown in Table 2.

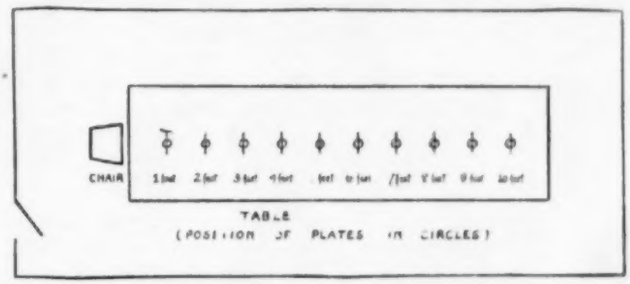

Fig. 1.—Arrangement of furniture and plates for tests.

TABLE 2.—PROJECTION OF B. PRODIGIOSUS FROM THE MOUTH WHILE THE FACE IS COVERED WITH A MASK OF COARSE GAUZE

Speaking in Ordinary Conversational Tone for 5 Minutes							Speaking in Loud Tone for 5 Minutes							Coughing for 5 Minutes						
Number of Layers of Gauze in Mask	Distance of Plates from Operator in Feet						Number of Layers of Gauze in Mask	Distance of Plates from Operator in Feet						Number of Layers of Gauze in Mask	Distance of Plates from Operator in Feet					
	1	2	3	4	5	6		1	2	3	4	5	6		1	2	3	4	5	6
2	0	0	0	0	0	0	2	**75**	**1**	**0**	**0**	**0**	**0**	2	**700**	**800**	**610**	**397**	**128**	**24**
3	0	0	**1**	0	0	0	3	**18**	**1**	**0**	**2**	**0**	**0**	3	**125**	**84**	**31**	**5**	**4**	**2**
4	0	0	0	0	0	0	4	**22**	**1**	**0**	**0**	**0**	**0**	4	**400**	**280**	**125**	**35**	**8**	**3**
5	0	0	**2**	0	0	0	5	**2**	**0**	**0**	**0**	**0**	**0**	5	**140**	**180**	**100**	**42**	**15**	**1**
6	0	0	0	0	0	**1**	6	**5**	**0**	**0**	**0**	**0**	**0**	6	**65**	**20**	**10**	**4**	**0**	**1**
7	0	0	0	0	0	0	7	**3**	**0**	**0**	**0**	**0**	**0**	7	**66**	**63**	**15**	**0**	**0**	**0**
8	0	**1**	0	0	0	0	8	**2**	**0**	**0**	**0**	**0**	**0**	8	**8**	**1**	**0**	**0**	**0**	**0**
9	0	0	0	0	0	0	9	**0**	**0**	**0**	**0**	**0**	**0**	9	**6**	**4**	**2**	**0**	**0**	**0**
10	0	0	0	0	0	**2**	10	**0**	**0**	**0**	**0**	**0**	**0**	10	**9**	**2**	**0**	**0**	**0**	**0**

SUMMARY OF TABLE 2

Coarse gauze masks worn from two to ten layers thick.

1. *Ordinary Conversational Speech for Five Minutes.*—One trial with each mask. *B. prodigiosus* was recovered five times, always in small numbers, on plates at variable distances. Three times organisms were found at 2 to 3 feet and twice at 6 feet. The latter possibly represents an error, as even without masks we never recovered organisms at this distance during ordinary

speech. The error, if present, is insignificant, since the remaining data are conclusive.

2. *Loud Speech for Five Minutes.*—With each mask, one trial. *B. prodigiosus* was recovered on plates from 1 to 4 feet distant with every mask up to eight thicknesses—in fairly large numbers with those up to four thicknesses, and in small numbers with those of from five to eight thicknesses.

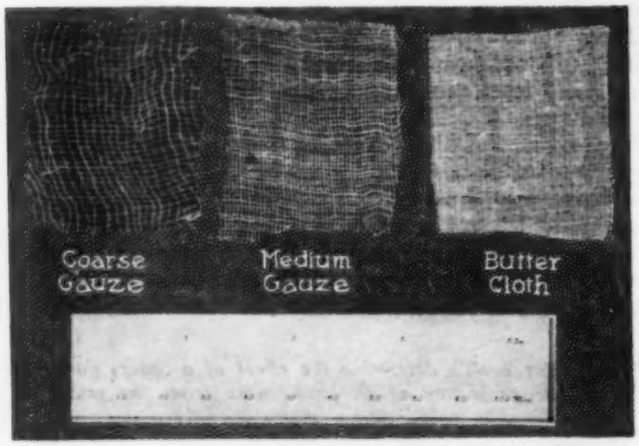

Fig. 2.—Material employed for masks.

3. *Coughing for Five Minutes.*—With each mask, one trial. *B. prodigiosus* was recovered in every instance. It was recovered in large numbers with masks of six thicknesses or less, up to 6 feet. With masks of greater thickness it was recovered in larger or smaller numbers at a distance of 2 or 3 feet.

Experiment 3.—*To determine the effect of a medium gauze mask in the projection of B. prodigiosus from the mouth during ordinary speech, loud speech, and coughing.*—The methods and technic of this experiment were exactly the same as in the preceding, except that the masks used were of a closer meshed gauze. The experiments of talking in an ordinary tone, talking in a loud tone, and coughing were repeated with each mask of from two to five layers in thickness.

Since the masks of from three to five layers proved to be effective as a barrier to organisms during ordinary speech, this experiment was abandoned with the thicker masks. Only loud talking and coughing were attempted with the masks of from six to ten layers.

The results of this experiment are shown in Table 3.

TABLE 3.—PROJECTION OF B. PRODIGIOSUS FROM THE MOUTH WHILE THE FACE IS COVERED WITH A MASK OF MEDIUM GAUZE

Speaking in Ordinary Conversational Tone for 5 Minutes						Number of Layers of Gauze in Mask	Speaking in Loud Tone for 5 Minutes						Number of Layers of Gauze in Mask	Coughing for 5 Minutes					
Distance of Plates from Operator in Feet							Distance of Plates from Operator in Feet							Distance of Plates from Operator in Feet					
1	2	3	4	5	6		1	2	3	4	5	6		1	2	3	4	5	6
5	0	0	0	0	0	2	220	4	0	0	0	0	2	15	6	1	1	1	0
0	0	0	0	0	0	3	1	0	1	0	0	0	3	39	25	12	2	1	0
0	0	0	0	0	0	4	0	0	0	1	0	0	4	45	21	8	1	0	0
0	0	0	0	0	0	5	0	0	0	0	0	0	5	2	1	0	0	0	0
—	—	—	—	—	—	6	1	0	0	0	0	0	6	0	1	0	0	0	0
—	—	—	—	—	—	7	2	0	0	0	0	0	7	8	10	7	9	7	6
—	—	—	—	—	—	8	0	0	0	0	0	0	8	5	0	1	1	1	0
—	—	—	—	—	—	9	0	0	0	0	0	0	9	3	6	1	1	4	1
—	—	—	—	—	—	10	0	0	0	0	0	0	10	1	0	0	1	0	0

Summary of Table 3

Medium gauze masks worn, from two to ten layers thick.

1. *Ordinary Conversational Speech for Five Minutes.*—With each mask of from two to five layers, one trial. *B. prodigiosus* was recovered in small numbers only on the 1 foot plate with two layer mask.

2. *Loud Speech for Five Minutes.*—With each mask of from two to ten layers, one trial. *B. prodigiosus* was recovered in five cases, never beyond 4 feet, usually in small numbers. The 1-foot plate with the two layer mask was heavily seeded.

3. *Coughing for Five Minutes.*—With each mask of from two to ten layers, one trial. In every instance *B. prodigiosus* was recovered in moderate numbers on plates from 2 to 6 feet distant.

Experiment 4.—*To determine the effect of a buttercloth mask on the projection of B. prodigiosus from the mouth during ordinary speech, loud speech and coughing.*—The methods and technic of this experiment were the same as used in the preceding, but the masks used were made of buttercloth. Ordinary speech, loud speech, and coughing were repeated with each mask of from two to ten layers in thickness.

The results of these experiments are shown in Table 4.

TABLE 4.—PROJECTION OF B. PRODIGIOSUS FROM THE MOUTH WHILE THE FACE IS COVERED WITH A MASK OF BUTTERCLOTH

Speaking in Ordinary Conversational Tone for 5 Minutes						Number of Layers of Gauze in Mask	Speaking in Loud Tone for 5 Minutes						Number of Layers of Gauze in Mask	Coughing for 5 Minutes					
Distance of Plates from Operator in Feet							Distance of Plates from Operator in Feet							Distance of Plates from Operator in Feet					
1	2	3	4	5	6		1	2	3	4	5	6		1	2	3	4	5	6
0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	2	0	0	0	0
0	0	0	0	0	0	3	0	0	0	0	0	0	3	0	0	0	0	0	0
0	0	0	0	0	0	4	0	0	0	0	0	0	4	0	0	0	0	0	0
0	0	0	0	0	0	5	0	0	0	0	0	0	5	0	0	0	0	0	0
0	0	0	0	0	0	6	0	0	0	0	0	0	6	0	0	0	0	0	0
0	0	0	0	0	0	7	0	0	0	0	0	0	7	0	0	0	0	0	0
0	0	0	0	0	0	8	0	0	0	0	0	0	8	0	0	0	0	0	0
0	0	0	0	0	0	9	0	0	0	0	0	0	9	0	0	0	0	0	0
0	0	0	0	0	0	10	0	0	0	0	0	0	10	0	0	0	0	0	0

Summary of Table 4.

Buttercloth masks worn, from two to ten layers thick.

1. *Ordinary Conversational Speech for Five Minutes.*—With each mask, one trial. *B. prodigiosus* not recovered.

2. *Loud Speech for Five Minutes.*—With each mask, one trial. *B. prodigiosus* not recovered.

3. *Coughing for Five Minutes.*—With each mask, one trial. *B. prodigiosus* recovered at 2 feet with the two layer mask only.

Repetition of the coughing experiments while two or three layer masks, both washed and unwashed, were worn, showed like results.

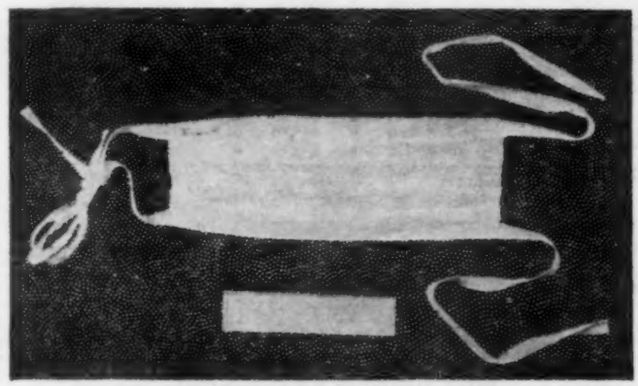

Fig. 3.—Mask, with tapes.

COMMENT

In 1899, Flügge and his followers,[1] working on the problem of tuberculosis infection, first advanced the theory of droplet infection. Briefly speaking, their experiments showed that if an observer retained in his mouth a suspension of *B. prodigiosus,* the organ-

1. Flügge: Ztschr. f. Hyg., 1899, **30,** 107. Laschschenko: Ibid., p. 125. Heyman: Ibid., p. 139. Hillyer: Brit. Med. Jour., 1903, **1,** 595

ism could be recovered on agar plates a meter distant during the acts of speaking, sneezing or coughing. In general they believed that if a person were coughed at from a distance of less than a meter, he might be infected by means of the projected droplets.

From our own work, however, we judge that the infected zone has a considerably greater radius. Our data indicate that during ordinary or loud speech, droplets are rarely projected more than 4 feet, irrespective of the duration of the experiment. In talking for thirty minutes there was no greater projection of bacteria than in talking for five minutes, though during the longer time there may be a heavier seeding of a plate within the effective range. During coughing, however, the danger zone is immensely widened. We were surprised at the distance we could project the organisms during a hard spell of coughing. At first we exposed plates only to a distance of 6 feet. Subsequently we exposed plates up to a distance of 10 feet, on which we recovered *B. prodigiosus* in sufficient numbers to suggest the possibility of even greater projection. We found that the chances of recovering *B. prodigiosus* from the more distant plates were increased if the observer renewed the organisms in his mouth during the period of coughing. From our work it would seem that the danger zone about a coughing patient has at least a 10-foot radius.

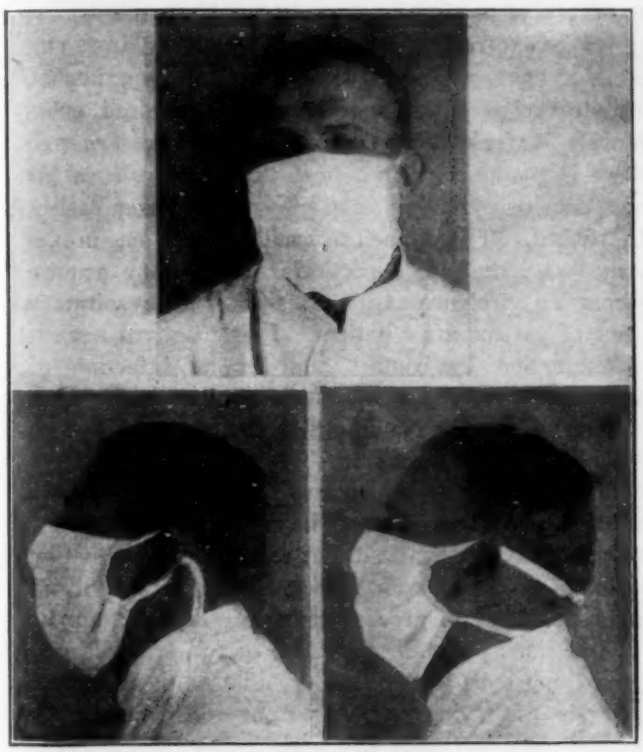

Fig. 4.—The mask as worn.

Our work has also convinced us of the futility of masks constructed from the coarser types of gauze, irrespective of thickness. We were constantly able to cough organisms through ten thicknesses of such material. A three layer buttercloth mask, however, appears to be effective in preventing the distribution of organisms from the mouth even during violent coughing. We have repeated experiments with this mask both before and after washing, with uniform results. Such a mask is not only effective, but easy to make and perfectly comfortable to wear.

These masks are also inexpensive. The quoted price per square yard of buttercloth is 14 cents. A square yard makes nine masks, each three layers in thickness. Each mask requires fifty-six inches of tape, costing about 2 cents. The cost per mask therefore is only between 3 and 4 cents, exclusive of labor. A mask may be repeatedly washed and used indefinitely. An indelible mark should be made on one side of the mask, and when the mask is put on, the same side should always be next to the face.

We have been using these masks in the Hospital of the Rockefeller Institute for physicians and nurses, and in some instances for patients; for example, during carriage to and from the roentgen-ray room, or when being moved about the corridors. They have also been used for ambulatory patients with head colds or other mild respiratory infections.

CONCLUSIONS

1. During ordinary or loud speech, infected material from the mouth is rarely projected to a distance of 4 feet, and usually less. A 4-foot danger zone exists about the patient under these conditions.

2. During coughing, infected material from the mouth may be projected at least 10 feet. The danger zone about a coughing patient has, then, a minimum radius of 10 feet.

3. Masks of coarse or medium gauze of from two to ten layers do not prevent the projection of infected material from the mouth during coughing. Such masks are worthless, therefore, in preventing the dissemination of respiratory infections.

4. A three layer buttercloth mask is efficient in preventing the projection of infectious material from the mouth during speaking or coughing. It is a suitable mask, therefore, to be worn in connection with respiratory diseases.

New and Nonofficial Remedies

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO NEW AND NONOFFICIAL REMEDIES. A COPY OF THE RULES ON WHICH THE COUNCIL BASES ITS ACTION WILL BE SENT ON APPLICATION. W. A. PUCKNER, SECRETARY.

SOLARGENTUM-SQUIBB.—A compound of silver and gelatin, containing 19 to 23 per cent. of silver in colloidal form.

Actions and Uses.—See Silver Protein Compounds (New and Nonofficial Remedies, 1918, p. 361).

Dosage.—Solargentum-Squibb is used in solutions containing 1 to 25 per cent., or more. It is also used in the form of bougies or suppositories.

Manufactured by E. R. Squibb & Sons, New York. No U. S. patent or trademark.

Solargentum-Squibb is produced by the interaction of silver oxide and gelatin in the presence of an alkali. When combination has occurred, the solution is concentrated *in vacuo* and the product scaled.

Solargentum-Squibb occurs in the form of black, lustrous, odorless, non-hygroscopic scales. It is very soluble in distilled water; insoluble in oils and alcohol.

No precipitate is produced when sodium chloride solution is added to an aqueous solution of solargentum-Squibb. An aqueous solution of solargentum-Squibb does not precipitate albumin; it is decomposed with precipitation by addition of free acids; ferric chloride decolorizes the solution.

To about 1 Gm. of powdered solargentum-Squibb, accurately weighed in a porcelain crucible, add a mixture of 4.5 Gm. of lead oxide and 0.5 Gm. of powdered tartaric acid. Rotate and mix in a crucible. Heat continuously until thoroughly carbonized and then heat in a blast flame until the lead button formed is about half its original size. Allow the crucible to cool, then place it in a beaker and dissolve the lead button containing the silver in dilute nitric acid. Transfer liquid, with washings, into an Erlenmeyer flask and titrate the silver nitrate with tenth-normal potassium sulphocyanate volumetric solution, using ferric ammonium sulphate as an indicator. The silver content corresponds to not less than 19 per cent. and not more than 23 per cent. of metallic silver (each Cc. of tenth-normal potassium sulphocyanate volumetric solution is equivalent to 0.0107 Gm. silver).

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SATURDAY, OCTOBER 12, 1918

QUARANTINE AND ISOLATION IN INFLUENZA

As indications of the attitude of civilian health officials with respect to the value and practicability of quarantine in influenza, it may be noted that the Illinois Department of Health has ordered that the patient must be quarantined until all clinical manifestations of the attack have subsided and the temperature has been normal for three successive days; that in New York City the patient is quarantined and, furthermore, so it is stated, the health department is prepared to compel patients "who may be so situated as to be a menace to the community to go into hospitals." In these and other places, influenza and pneumonia have been made reportable diseases.

The officials of the Navy at first glance seem to be of a different opinion in regard to quarantine in influenza, as indicated by the following extract from Bulletin 37,[1] of the Division of Sanitation of the Bureau of Medicine and Surgery, dated Aug. 9, 1918:

> *Control in the Navy.*—Quarantine and isolation are impracticable on account of the wide distribution of the organism [*B. influenzae*] in healthy persons and the number of unrecognizable cases.

This sounds like a decidedly reactionary statement, but it is possible that it refers to the units in which cases arise, or possibly to persons who have been in especially close contact with those that fall sick, because the remaining sentences of the paragraph read:

> Patients, however, should be put to bed at once, and bed isolation, prevention of droplet infection, and prompt disinfection of mess gear, handkerchiefs, etc., practiced as in measles. Where sick bays or wards are not available for isolation, the use of sheet screens between patients is to be recommended.

Whatever the real meaning of the sentence to the effect that quarantine and isolation are impracticable, the danger to life from influenza in this epidemic is so grave that it is imperative to secure for the individual patient the most complete isolation, whether in home or hospital, not only to prevent the spread of infection from the patient but also to prevent new and secondary infections from reaching the patient. This need to protect the sick is not emphasized in current advice and instructions to the public from the official and other sources. It appears, too, that in many if not most hospitals little or no attention is paid to the danger of cross-infections with virulent bacteria among their influenza patients. So far as we know, the actual situation in influenza seems to be this: THE PRECISE CAUSE OF THE PRIMARY ACUTE RESPIRATORY INFECTION IS NOT KNOWN—IT MAY BE THE INFLUENZA BACILLUS; AS YET DEFINITE PROOF IS WANTING—BUT THE MOMENTOUS PERIL SO FAR IS THE DEVELOPMENT OF PNEUMONIA, AND THIS APPEARS TO BE ASSOCIATED WITH AND IN ALL LIKELIHOOD CAUSED BY DIFFERENT BACTERIA, OF WHICH THE INFLUENZA BACILLUS, HEMOLYTIC STREPTOCOCCI, AND PNEUMOCOCCI ARE THE MOST IMPORTANT. We know that in experiments, streptococci and pneumococci may be raised enormously in virulence by successive animal passage, and there is good reason to believe that the virulence for man is increased by repeated transmission from patient to patient. The influenza bacillus may act in the same way, that is, a particular strain may acquire increasing virulence as it passes from the respiratory tract of patient after patient. It is to guard against dissemination by contact and droplet infection of strains with exalted virulence that individual isolation is demanded. The conditions in the present influenza outbreak are analogous to those in the cantonments with respect to streptococcus bronchopneumonia in measles, and are to be met in the same ways so far as possible. It is realized that at present the situation in many places is such that individual isolation and other measures to prevent cross-infection are out of the question; but the importance of the principle discussed must be recognized so that with time our methods of caring for respiratory infections may become more and more effective.

1. Measures for the Prevention of the Introduction of Epidemic Influenza, Pub. Health Rep., 1918, **33**, 1540.

ADEQUATE SUPPLY OF PHYSICIANS MAKES LOWER EDUCATIONAL STANDARDS UNNECESSARY

According to the Census Bureau estimate for 1917, the population of the United States was 106,543,317, and according to the new American Medical Directory, the total number of physicians is 147,812. At the present time, therefore, there is one physician to every 720 people. In the various countries of Europe, just before the world war began, the proportion of physicians, according to the best available authorities, was from one to every 1,500 to one to every 2,500 people.[1] Numerically speaking, therefore, more than half of the

1. We have not included in these calculations the thousands of osteopaths, chiropractors, naprapaths, physcultopaths, and other cult practitioners who, outside of the United States and Canada, are not to be found in other countries.

physicians of the United States, or actually 76,783, might be withdrawn from civil practice before the proportion to the population would be as low as the highest proportion in any country of Europe, namely, one to every 1,500 of population. One physician to every 1,500 people could readily supply all the needs in thickly populated communities, but the more sparsely settled rural communities would doubtless need a larger proportion—say one to every 1,000. On this basis for the entire country, it would require one physician for about every 1,200 people. If properly distributed, this would be a reasonable proportion considering the improved roads and other means of accessibility by which a physician can now cover a much wider territory than heretofore. Based on the number of applications now going through for commissions in the Medical Department of the Army, there will be at least 35,000 physicians who have been commissioned or will have been offered commissions in the Army and the Navy by Nov. 1, 1918. As a maximum, however, not more than 40,000 physicians could possibly be needed by the government service unless the war should continue more than two or three years longer. This would still leave in civil practice one physician to every 988 population. The annual output from the medical schools in recent years has been approximately 3,000 physicians, more than covering the annual loss from deaths.

It is evident, therefore, that so far as the supply of physicians is concerned, there is clearly no danger of a shortage being produced by the present world war even if we should be called on to supply the needs of some of our allies. Consequently there is positively no basis for arguments favoring the reduction of educational standards. As a matter of fact, our medical colleges might all be closed for several years and the annual supply of physicians entirely cut off, and the number of physicians in the United States would still remain in a higher proportion to the population than in the most favored country of Europe. The only valid reason why medical schools should be kept going is that in recent years they have turned out physicians who are eminently better qualified than those of earlier years, and this one reason would be removed if educational standards should be lowered. It is only during the last eight or ten years that the majority of medical graduates each year have had the benefit of higher preliminary qualifications, of better equipped laboratories, of better hospital facilities, and of a training under larger numbers of full time, salaried, expert teachers. Our superabundance of physicians is mostly made up of those who did not have the benefit of these greatly improved conditions in medical schools, many of whom, however, be it said to their credit, through graduate courses and study, have kept up with the advances made in medical knowledge.

Those who are arguing for a reduction in standards on the plea that there is a need of physicians are either misinformed in regard to the facts or have certain special interests which they are striving to uphold. In the light of these facts it is urged that licensing boards generally enforce the present reasonable standard of two years of collegiate work as the minimal requirement of preliminary education. The argument that there is a dearth of physicians should not be looked on as an excuse for lowering educational standards in the interest of any pseudomedical cult. Let the present educational standards, which have been successfully established in recent years, be upheld so that the name of America, from the standpoint of medical education, may retain the high position educationally that it has recently attained among civilized nations.

IS EPIDEMIC POLIOMYELITIS PREVALENT IN ENGLAND AND FRANCE?

During the last six months there has been observed in England[1] and France[2] what has seemed an epidemic of a rather obscure origin. The various names applied to the condition—infective ophthalmoplegia, toxic ophthalmoplegia, acute infective ophthalmoplegia, acute encephalitis, epidemic lethargic encephalitis, botulism, Heine-Medin disease, etc.—show that considerable doubt prevails as to its nature. In England the largest number of cases have been recorded in London, but cases have been reported from many other parts of that country and of Wales.

According to Hall,[1] the main features of the cases so far observed are as follows: The patient, while in ordinary health, begins to be languid and drowsy, with or without other symptoms. In a few hours or days the weakness has increased and, indeed, may amount to complete prostration, so that he lies helpless in bed and can hardly move a muscle. Now the drowsiness becomes more marked and deepens into lethargy. Fever may be absent, or it may be present from the first, become severe, and persist. Cerebral excitement and delirium have been prominent features in some cases. In most cases, local symptoms pointing to lesions in the bulbopontile area are present at some time or other. Of these, ptosis, ophthalmoplegias of varying extent, nystagmus, facial palsy of lower neuron type, unilateral or bilateral, speech affections and dysphagia have occurred in different combinations in different cases. Muscular tremors of a curious kind have been noted in some. In some cases the general muscular asthenia has been more marked on one side

1. Harris: Acute Infective Ophthalmoplegia or Botulism, Lancet, London, 1918, **1**, 568. Hall: Toxic Ophthalmoplegia, ibid., 1918, **1**, 568. Melland: Epidemic Poliomyelitis, Brit. Med. Jour., 1918, **1**, 559. Crookshank: Botulism and Heine-Medin Disease, Lancet, London, 1918, **1**, 699.

2. Netter: Epidemic Lethargic Encephalitis, Bull. de l'Acad. de méd., 1918, **79**, 337.

of the body than on the other—either arm alone or arm and leg.

Lumbar puncture has been negative bacteriologically and otherwise. Persons of all ages have been affected, but by far the majority of all cases have occurred in persons over 20 years of age. Sex and occupation seem to play no part, and in only one instance were there two cases in one family.

There has been observed congestion of the meninges and small hemorrhages in the brain substance, sometimes so large that the spinal fluid is bloody. There is cellular infiltration around the vessels and especially those in the bulbar and basal nuclei. Other parts of the brain may be involved.

In England the mortality has approached 20 per cent.; in France it was over 50 per cent., but the recovery seems to be complete in those that survived. The disease may last only a few days or it may persist for weeks or two or three months or more, the patient finally recovering when a fatal termination seemed inevitable, the sacrum, buttocks, spine and heels being covered with eschars. In fatal cases the length of the illness has varied from ten days to six weeks, and death seemed to be due to bulbar paralysis. The signs and symptoms thought to point to botulism have been vomiting, transient facial palsy, transient ptosis, absence of spinal paralysis, drowsiness and absence of fever and constipation, with dryness of the nose and mouth. Although in a considerable number of cases there was a history of the recent consumption of canned food, cheese, bacon, ham and sausages, these and other now exceptional foods had not been consumed in the majority of the cases, and no particular food has been found to be related to the outbreak. So far, no bacteriologic proof is forthcoming that any of the cases were due to bacterial infection or to intoxication by the products of bacterial activity, whether associated with food consumption or not. Against the suggestion of botulism is the fact that a case has been observed in an infant at the breast, and also that thus far *Bacillus botulinus* has not been identified.

Netter[2] insists that the disease cannot be a form of poliomyelitis, stating that this epidemic occurred during the winter and spring months, while poliomyelitis occurs almost always in the autumn; that the majority of persons affected were adults, while poliomyelitis affects mostly children, and that the spinal fluid was normal, which is not the case in poliomyelitis. In the present epidemic there were also few meningeal symptoms, and the mortality was very high —50 per cent. In poliomyelitis the meningeal symptoms are much more marked, and the mortality is much lower—about 11 per cent.

Reviewing the facts in regard to poliomyelitis, we find that epidemics very much similar to the one in question have been reported before. Hence we are probably here dealing with an epidemic of poliomyelitis, though perhaps of a rather unusual distribution in the nervous system. In regard to season, Wickman has reported an epidemic in Sweden lasting through the winter with its maximum in April and May. As to adults, there are great variations; at times the percentage is high and at other times low. An epidemic is reported by Müller, on the island of Nauru, where some 700 cases occurred, the majority of which were in adults.

In regard to the spinal fluid, it is sterile and usually clear in poliomyelitis. There is cellular increase consisting of polymorphonuclears at first and later of lymphocytes; but the cells rapidly disappear from the fluid so that after the first two weeks the count is either normal or nearly so. As to globulin, during the first week it is found in only half of the fluids, and after the third week there is a decrease. Accordingly the condition of the spinal fluid would depend on the time it was examined. At any rate, the question of whether a person may have poliomyelitis without having any changes in the spinal fluid is at present an open one.

The meningeal form of poliomyelitis is, of course, common, and at times the picture of meningitis may be so marked as actually to obscure the real nature of the disease; but there is also the atoxic or asthenic form in which there is drowsiness, stupor, etc., as in the present epidemic. Many of the reported cases, in England at least, have also shown marked meningeal symptoms. The mortality rate varies in the different epidemics of poliomyelitis. The younger children have a better chance for life than the older children and adults. In Wickman's cases the mortality was 27.6 per cent. in persons between 12 and 32 years of age. In one small epidemic he saw a mortality of 42.3 per cent. Lindner and Mally report a mortality of 50 per cent. in persons over 10 years of age. In the New York epidemic in 1916 the fatality rate was 27.2 per cent. in New York City. This tallies closely with the present epidemic in England and France. The various eye symptoms reported indicate an involvement of the third, fourth and sixth cranial nerves; the facial paralysis, involvement of the seventh; and the difficulty in swallowing and affection of the tongue, involvement of the ninth and twelfth. As a matter of fact, these cranial nerves are those most frequently involved in poliomyelitis. In the bulbar form of poliomyelitis, which means localization in the pons and medulla, the combinations of paralyses mentioned are observed.

Further investigations are in progress. From this without doubt we shall learn that this is not a new disease, but that the epidemic is one of poliomyelitis, the cerebral type being predominant, and in many respects both epidemiologically and clinically similar to the New York epidemic of 1916.

Current Comment

THE PRESENT EPIDEMIC OF INFLUENZA

The present epidemic of influenza spreads so rapidly—attacks in a new spot so suddenly—that it is difficult to discuss its incidence at the time THE JOURNAL goes to press without great fear that it will have completely changed by the date of publication. As we write it is reported that cases in the Army camps are decreasing, some 11,750 new cases having been reported in all Army camps during the twenty-four hours ending noon, October 8. New cases of pneumonia have likewise decreased, totaling some 2,181 with a mortality of 781 for the twenty-four hours. At that date the total number of cases of influenza reported from all Army camps since the disease became epidemic was placed at almost 200,000, with some 20,000 pneumonia cases and between 5,000 and 6,000 deaths in the Army alone. The civilian population has likewise suffered greatly, particular points of attack being in the New England states, in Pennsylvania and in Indiana.

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As pointed out elsewhere, the great danger is not from influenza, but from secondary complications communicated in the same manner as the influenza itself. Influenza uncomplicated by cross-infection, in the ordinary person, will run its course, and those who have it will recover. The secondary pneumonia is quite infectious and a serious complication, which up to date has occurred in some 10 per cent. of the cases and which has a mortality between 25 and 33⅓ per cent. of all the persons whom it attacks. The prevention of this pneumonia is dependent on a strict isolation of the influenza patient, not so much to protect others against the influenza, but to protect the patient against pneumonia through cross-infection.

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In some cases at least an exceedingly rapidly progressing form of pneumonia develops early in the disease, with a great deal of fluid, the lung being only partially consolidated. The patients may die with a great deal of frothy fluid in the bronchi, trachea, throat and nose, practically drowning in their own fluid. In many cases this pneumonia begins practically at the same time as the influenza itself, and it is these cases which proceed to a rapidly fatal termination. At the same time, indications are that other forms of pneumonia likewise occur. In others, the influenza is a simple uncomplicated and rather harmless disease.

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An interesting feature of the present epidemic is the change in the attitude of the public toward public health methods. The changes incident to the war have caused the public to accept freely orders and suggestions as to their mode of living. When health authorities place a ban on public gatherings, when they insist that the windows of public conveyances be kept open, when they insist on absolute quarantine in order to stop the spread of the disease, the public is ready to obey, and does obey to the fullest measure. Another feature is the confidence of the public in public health authorities, apparently the result of the intense education of the public in prophylaxis of disease which has been going on during the past decade. Orders concerning the epidemic are received without panic or alarm.

MEDICAL STUDENTS IN THE STUDENTS' ARMY TRAINING CORPS

Authority has finally been secured from the War Department for the transfer of students in the Medical Enlisted Reserve Corps to the Students' Army Training Corps, and full instructions will be issued shortly—after certain details have been arranged. This will affect students in the second, third and fourth years of the medical schools. Those enrolled as freshmen medical students are eligible for the Students' Army Training Corps in such medical schools as have established units, or any medical schools that are connected with universities having such units. This provides for uniforms, housing, board, tuition, and pay of $30 a month, the same as for other students in the Students' Army Training Corps. Premedical students likewise may enter the Students' Army Training Corps if the colleges in which they are students have units. All this, aside from students transferring from the Medical Enlisted Reserve Corps, applies only to registrants on September 12. It is expected that some provision will also be made for students who registered prior to September 12. Those in Class 1 who are not qualified for general military service are eligible for admission to the Students' Army Training Corps, and those belonging to deferred classes, if physically qualified, are eligible to enter the Students' Army Training Corps.

DEVELOPMENT FOR PHYSICALLY DISQUALIFIED STUDENTS

It is reported that between 20 and 25 per cent. of the boys examined for the Students' Army Training Corps in the universities and colleges are failing to meet the physical standards adopted for soldiers. This is due largely to underdevelopment and underweight. These boys therefore fail to gain admission to the Students' Army Training Corps; they are not entitled to wear uniforms, and remain in school as civilians. Boylike, these young fellows in civilian clothes are sensitive, and fear that they may be branded as slackers. It has been suggested that the school authorities recognize this condition and provide for some insignia to distinguish those boys disqualified for physical reasons from those who have made no attempt to qualify. While we do not believe in grownups wearing a badge as a proof of their patriotism, there may be some reason for the wearing of such a badge in these schools. But we suggest that instead of supplying these boys with badges, the school authorities recognize the splendid opportunity and institute a plan for developing these boys so that they may become physically fit to wear the uniform. The ideal thing would be for the individual schools to form Development Corps of

those physically disqualified and put them in a uniform adopted by the school itself. This would be a stimulus for the boys to cooperate with the University in attaining physical fitness and promotion to the Students' Army Training Corps.

Medical Mobilization and the War

Appointment in the Medical Reserve Corps and Acceptance of Commission

The important decisions relative to appointment in the Medical Reserve Corps have just been promulgated by the Surgeon-General's Office:

(*a*) Graduates of 1918 will be required to serve one year's internship in a civil hospital before being considered eligible for a commission.

(*b*) No more appointments are being made in the Medical Reserve Corps. All commissions issued are in the United States Army. There is no inactive status in the United States Army, consequently the order to active duty invariably accompanies notices of appointment from the Adjutant - General's Office. The newly appointed officers are given fifteen days in which to comply with the Adjutant - General's orders. A failure to comply or to accept a commission within the specified time will be considered by the Adjutant-General as a declination of commission. The appointment will be cancelled and if the applicant wishes a new appointment it will be necessary for him to be reexamined as for an original appointment.

Surgeon-General Merritte W. Ireland

Physicians Needed by Public Health Service

We again call attention to the fact that the United States Public Health Service is in need of physicians to assist it in carrying out its enlarged work in connection with the health conditions in extracantonment and camp zones. This offers an opportunity for those physicians who want to do war work, and who can not, or do not want to, obtain a commission in the Medical Corps of the Army or Navy. Physicians desiring to help in this work should write to the Surgeon-General of the Public Health Service, Washington, D. C. The Journal is prepared to supply forms on which to make formal application. These forms are for the purpose of indicating the applicant's qualifications, and to show in what way he can be best used—whether in a hospital or in public health and sanitary work. The pay is from $2,000 to $2,500 a year. If quarters and subsidence are furnished, the pay is $1,800 a year. No physical examinations are required other than to ascertain whether the physician is able to perform the duty for which he desires to be appointed. These appointments are as acting assistant surgeons since at this time there is no provision for commissions. No examinations are required to qualify. The appointment does not exempt one from the Selective Service Law.

Surgeon-General Merritte W. Ireland

On October 3 the President sent to the Senate the following nomination: "To be Surgeon-General with the rank of Major-General: Major-General Merritte W. Ireland, M. C., U. S. Army." It may be taken for granted that this nomination will be confirmed by the Senate. The appointment of General Ireland to this position will give general satisfaction to the Medical Department of the Army. The record of General Ireland in the Medical Department is a record of thorough, conscientious service fitting him particularly for the position which he now is to occupy.

He was born at Columbia City, Ind., May 31, 1867, was graduated from the Detroit College of Medicine in 1890, and followed his graduation with an internship in St. Mary's Hospital, Detroit, from 1889 to 1890; was graduated from Jefferson Medical College, Philadelphia, in 1891, immediately afterward entering the service as first lieutenant and assistant surgeon on May 4, 1891. He began his military career at Jefferson Barracks, Mo., on May 27, 1891, on May 4, 1896, he was made captain and assistant surgeon. In the Spanish-American War he served with the Fifth Army Corps in Cuba and later at Camp Wyckoff, N. Y., on April 17, 1899, becoming surgeon with the rank of major of the 45th United States Infantry. At this time he went with his command to the Philippine Islands, serving in several campaigns and being officially commended by the chief surgeon. In April, 1900, he took charge of the medical supply depot of the Division of the Philippines at Manila, and was honorably discharged from volunteer service, June 30, 1900. In 1902 he entered the Surgeon-General's Office, working under Surgeon-General O'Reilly and continuing under Surgeon-General Torney. He was promoted to major and surgeon and to major, M. C., Aug. 3, 1903, and to lieutenant-colonel, May 1, 1911. He left the office of the Surgeon-General in 1912, again going to the Philippines, where he was stationed as post surgeon at Fort William McKinley. He thus had a continuous service in the Surgeon-General's Office of approximately ten years. He returned to the United States and was placed in charge of the base hospital at Fort Sam Houston in 1916, and accompanied General Pershing to Mexico as surgeon of the American Expeditionary Forces to Mexico. When the United States entered the great war he accompanied General Pershing to France as chief surgeon of the American Expeditionary Forces, was promoted to the rank of brigadier-general, May 1,

1918, and more recently to the rank of major-general and Surgeon-General of the expeditionary forces.

Our new Surgeon-General is, therefore, fitted especially to conduct the medical service of the Army through the remainder of the war, as well as in times of peace. He has filled practically every position to which the men who will serve under him may be called—surgeon of volunteers, post surgeon, assistant in the Surgeon-General's Office, supply depot, surgeon-general of the expeditionary forces—a complete record which indicates that the chief will know what confronts each of his subordinates.

BRIGADIER-GENERAL NOBLE TO BE SURGEON-GENERAL FOR EXPEDITIONARY FORCES

Included with the nominations sent to the Senate by the President, October 3, was the appointment of Brig.-Gen. Robert E. Noble to take the place vacated by General Ireland as Surgeon-General for the American Expeditionary Forces. General Noble was born in Georgia in 1870. He was educated in the Polytechnic Institute of Alabama, receiving his B.S. degree in 1890 and the M.S. in 1891 and was graduated in medicine by Columbia University in 1899. He was appointed assistant surgeon in 1901, and was an honor graduate of the Army Medical School in 1904, then was appointed captain and assistant surgeon in the Medical Corps, June, 1906, and major in January, 1910. From 1907 to 1914 he served with General Gorgas in the Canal Zone and was efficient in helping to secure the wonderful sanitary results which made the building of the Panama Canal possible. When General Gorgas was made Surgeon-General, Major Noble accompanied him to the Surgeon-General's Office, taking over the personnel department. As chief of the personnel division he was instrumental in building up the large personnel of the Medical Reserve Corps which today constitutes the large majority of the commissioned portion of our Medical Department. Later, in addition to his other duties, he was called to assume the duties of director of hospitals on this side of the Atlantic, and at the time of his present appointment was engaged in completing arrangements for the care of the sick and wounded who are to be returned from Europe, or who may need hospital care in the United States. This is the fundamental work in the Department of Reconstruction and Rehabilitation.

MAJOR-GENERAL ROBERT E. NOBLE

General Noble has had a wide experience in sanitation, and as assistant Surgeon-General is thoroughly acquainted with the administrative work of the Surgeon-General's Office which will be helpful in his new position. In every respect he is well qualified for the new functions and responsibilities he will assume in France as head of the Medical Division of our Expeditionary Forces.

Promotions of Medical Officers

Recent records carry the following promotions: Major-Gen. Merritte W. Ireland (Colonel, M. C.), now holding the emergency rank of Major-General, to be Major-General and Surgeon-General; Brigadier-Gen. Robert E. Noble (Lieutenant-Colonel, M. C.), now holding the emergency rank of Brigadier-General, to be Major-General for the period of the present emergency, for service abroad, succeeding Major-General Ireland as first assistant Surgeon-General; Col. Edward L. Munson to be Brigadier-General for the period of the emergency; Cols. James D. Glennan, William S. Thayer and John M. T. Finney to be Brigadier-Generals, M. C. Lieutenant-colonels, M. C., to colonels, M. C. (emergency), Sept. 4, 1918: E. F. Geddings, Fort Adams, R. I.; G. McD. Van Poole, Honolulu, T. H.; J. F. Hall, Plattsburg Barracks, N. Y.; L. M. Hathaway, Fort Baker, Calif.; A. M. Whaley, Washington, D. C. Majors, M. C., to lieutenant-colonels, M. C. (emergency), Sept. 6, 1918: H. C. Coe, New York; J. B. Carnett, Philadelphia; E. S. Kilgore, San Francisco; A. W. Elting, Albany, N. Y.; W. D. Webb, Washington, D. C.; J. B. Walker, New York; D. D. Lewis, Chicago; E. H. Fiske, Brooklyn; W. M. L. Coplin, Philadelphia; C. L. Chase, Chickamauga, Ga.; S. C. Gurney, Detroit; V. P. Blair, St. Louis; A. Greenwood, Boston. Sept. 7, 1918: J. W. Amesse, Denver; A. E. Cohn, New York; J. J. Dowling, Boston; W. Gillespie, Cincinnati; S. McGuire, Richmond, Va.; G. B. Webb, Colorado Springs, Colo.; W. F. Wesselhoeft, Boston.

Promotions in Medical Corps of the Navy

The following promotions in the Medical Corps of the Navy are announced: As rear admirals, U. S. Navy, medical directors Albert M. D. McCormick and Robert Morris Kennedy; as permanent captains, Surgs. Charles E. Riggs, Ammen Farenholt, Middleton S. Elliott, Frank L. Pleadwell, Dudley N. Carpenter, James C. Pryor and Washington B. Grove; as temporary captains, Surgs. Raymond Spear, John B. Dennis, Eugene J. Grow, Frank E. McCullough, Granville L. Angeny, William H. Bell, Holton C. Curl, Edward G. Parker, Henry E. O'Dell, James S. Taylor, Joseph A. Murphy, Charles E. Freeman, Charles St. J. Butler and John M. Brister.

Appointment in War Risk Bureau

Dr. Edson W. Glidden, 2d, has been appointed assistant medical director of the War Risk Insurance Bureau, Medical Department, in charge of the tuberculosis department. This will interest those who realize how many tuberculous ex-soldiers and sailors are cared for by this bureau. Dr. Glidden was for several years assistant superintendent of the Lakeville Tuberculosis Sanatorium, Middleboro, Mass.

For Addition to the Hygienic Laboratory

A bill is under consideration in Congress for an appropriation of $250,000 to build a much needed addition to the Hygienic Laboratory of the Public Health Service in Washington, D. C., and in the House, a special rule has been brought in making this bill a special order.

COMMISSIONS ACCEPTED, MEDICAL CORPS, U. S. ARMY

Previous lists published in THE JOURNAL, June 1, 22 and 29, July 13, 20 and 27, August 3, 10, 17, 24 and 31, September 7, 14, 21 and 28 and October 5.

ALABAMA

Birmingham—Edmondson, J. H.
Weed, W. A.
Downs—Sankey, J. M.

ARKANSAS

Banks—Smith, S. E.
Drakes Creek—Hill, N. J.
Greenbrier—Henderson, G. L.
Hoxie—Stidham, J. H.
Little Rock—Judkins, W. D.
Warren—Martin, R.

CALIFORNIA

Banning—Coffman, H. L.
Burlingame—Burnham, M. P.
Eagle Rock—Dirks, C. B.
Fillmore—Osborn, H. B.
Lindsay—Tourtillott, W. W.
Los Angeles—Fellows, A.
Mann, H. H.
Oakland—Pomeroy, G. T.
San Francisco—Kinslow, F. A.
Spiro, H.
Waste, J. M.
Sherman—Perry, J. R.
Venice—Sands, R. A.

COLORADO

Carbondale—Tubbs, W. R.
Denver—Bergtold, W. H.

CONNECTICUT

West Haven—Rogers, P. H.

DISTRICT OF COLUMBIA

Takoma Park—Adams, J. L.
Washington—Key, S.
Malloy, W. J.

FLORIDA

Orlando—Pillans, P. P.

GEORGIA

Albany—Ward, M.
Atlanta—Graham, J. M.
Nelson—Turk, J. P.

ILLINOIS

Belvidere—Andrews, R. B.
Blue Island—Finkel, M.
Chicago—Beaton, L. A.
Davis, B. F.
Ellis, J. D.
Fomon, S.
Klempter, D.
retschmer, H. L.
evett, J.
Oliver, E. W.
Seidner, M. P.
Wright, R. F.
Findlay—Gregory, C. S.
Hobinson—Allen, J. L.
Kampsville—Woltman, F
La Salle—Woods, R. H.
Moline—Wahlberg, K. W.
Oak Park—Potter, W. E.
Rushville—Fleming, C. M.
Shelbyville—Thompson, T.
Toulon—Berfield, C.
Waukegan—Claeboe, A. H.

INDIANA

Evansville—Hurst, W. R.
Indianapolis—MacDonald, J. A.
McCool, J. F.
Reynolds, D. M.
Wheeler, H. H., Sr.
Linton—Custer, A. T.
Lowell—Iddings, J. W.
New Albany—Funk, C. C.
New Town—Stanfield, W. V.
Redkey—Markley, H. W.
Rockport—Weiss, H. G.
Terre Haute—Gekler, W. A.
Waynetown—Roark, C. A.

IOWA

Cherokee—Donahoe, G.
Earlville—Rogers, C. B.
Knoxville—Weiss, J. M.
Montour—Corns, W.
New London—Boggs, N.
Shenandoah—Weaver, J. O.
Sibley—Winkler, F. P.

KANSAS

Clay Center—Speer, W. L.
Kansas City—Harder, I. E.
Lansing—Faulkner, J. T.
Wichita—Seydell, E. M.

KENTUCKY

Burkesville—Talbot, J. G.
Covington—Smith, L. L.
Louisville—Allen, E. S.
Gribble, B. G.
Morris, C. D.
Paducah—Shemwell, A. H.
Summer Shade—Wells, G. M.

LOUISIANA

New Orleans—Bell, T. P.

MARYLAND

Annapolis—Hopkins, W. H.
Purvis, J. O.
Baltimore—Crook, C. S.
Parker, L. M. C.
Savage—Shipley, F. E.

MASSACHUSETTS

Boston—Ahern, J. F.
Gooding, J. H.
Stearns, R. T.
Concord—Bartlett, W. B.
East Boston—Wilcox, C. F., Jr.
Laurel—Seay, T. H.
Malden—Howard, H. J.
Middleborough—Burkhead, J. H.
Palmer—Cheney, H. C.
Pittsfield—Bard, H. H.
Springfield—Goodell, W.
McKechnie, F. J.
Radding, M. B.
Rice, A. G.
Westborough—Downing, D. F.
West Roxbury—Jillson, F. C.
Worcester—Cahill, J. W.

MICHIGAN

Detroit—Cowen, R. L.
Currie, E. M.
Hall, A. C.
Sanderson, A. R.
Highland Park—Northrup, H. F.
Ogden Center—Vandusen, C. A.
South Haven—Wiley, H. W.

MINNESOTA

Duluth—Anderson, L. N.
Hibbing—Lee, T. A., Jr.
Little Falls—Holst, C. F.
Rochester—Horgan, E. J.
St. Paul—Nelson, L. A.
Waseca—Guyer, L. G.

MISSISSIPPI

Greenwood—Kennedy, J. P.
Mount Olive—White, J. P.
Thomastown—O'Cain, E. C.

MISSOURI

Bonne Terre—Monroe, L. E.
Cane Hill—Allder, A. E.
Carrollton—Atwood, W. G.
Farmington—Tate, P. S.
Fredericktown—Slaughter, S. C.
Hume—Williams, J. H.
Kansas City—Bryant, C. H.
Dorsheimer, G. V.
Poplar Bluff—Eure, J. B.
Roscoe—Stratton, C. S.
St. Joseph—Hansen, W. J.
Minton, W. H.
St. Louis—Fitzporter, A. L.
Gettys, H. B.
Hughart, H. H.
McKellops, L. G.
Reim, W. H.
Tilles, R. S.
Wayland—Riggs, J. M.

MONTANA

Billings—Balsam, E. G.
Great Falls—Titus, C. I.
Rudyard—Schulberg, P. A.
Shelley—Ridle, M. D.

NEBRASKA

Archer—Paxton, C. C.
Wakefield—Coe, C. B.

NEVADA

Reno—Smith, L. V.

NEW JERSEY

Dover—Costello, W. F.
Jersey City—Brown, H. W.
Ovens, R. C.
Newark—Haussling, F. R.
Lowery, J. H.
Princeton—Tenbroeck, C.

NEW MEXICO

Roswell—Fall, H. V.

NEW YORK

Auburn—Sisson, L. B.
Bellmore—Holcomb, H. V.
Broadalbin—Hall, R. M.
Brooklyn—Blackmar, B. G.
Doyle, G. J.
Doyle, S. B.
Gissel, H. W.
Morrison, R. P.
Siulzinski, M. R.
Buffalo—Critchlow, G. R.
Cortland—McGraw, W. H.
Leicester—Fiero, C. M.
New York—Bondy, J.
Epstein, A. A.
Hall, J. S. K.
Holladay, E. W.
Hunt, J. R.
Lanbsacher, S. H.
Meeker, H. E.
Mixsell, H. R.
Roberts, P. W.
Rosenfled, M.
Stillman, E. G.
Tenner, A. S.
Norwich—McNitt, H. W.
Rochester—Buck, T. D.
Kennedy, E. W.
Searles, W. I.
Summer, C.
Staten Island—Craig, H. A.
Syracuse—Potter, C. F.
White Plains—Parker, J. S.
Yonkers—Trotter, J. P.

NORTH CAROLINA

Ashboro—Miller, J. F.
Raleigh—Knox, A. W.

OHIO

Ada—Neiswander, L. C.
Ansonia—Stephen, C. I.
Barberton—Livermore, F. B.
Pellefontaine—Stinchcomb, W. G.
Canton—Exline, C. E.
Cincinnati—Schlemmer, E. W.
Cleveland—Hanzlik, P. J.
Dayton—Meckstroth, H. L.
Wellbrook, G. H.
East Liverpool—Davis, F. F.
Mantua—Knolton, E. H.
North Star—Hartzell, J. D.
Ottawa—Beardsly, C. O.
Portage—Fisher, E. W.
Quincy—Curl, A. M.
Spencerville—Baxter, I. D.
Strasburg—Bainter, G. F.
Tiffin—Leister, R. B.
Toledo—Sinkey, R. E.
Smead, L. F.
Vetter, E. F.
Youngstown—Ranz, W. E.
Ryall, W. W.

OKLAHOMA

Centrahoma—Nelson, J. A.
Hugo—Wolfe, R.
Hulen—Burnett, B. H.
Kusa—Thompson, W. A.
Muskogee—Vitum, J. S.
Oklahoma—Burns, T. C.
Shawnee—Scott, J. H.
Tulsa—Woody, W. W.

PENNSYLVANIA

Chambersburg—Gelwix, J. M.
East Brady—Wallace, W. S.
Glenfield—Lyon, W. R.
Imperial—Sprowle, G. M.
Milford—Kenworthy, W. B.
Philadelphia—McKeage, W.
Silverman, A.
Pittsburgh—Bryant, W. C.
Crozier, A. W.
Cruikshant, O. T.
Jahn, A. H.
Tucker, G. F.

RHODE ISLAND

Providence—Appleton, P.

SOUTH CAROLINA

York—McDowell, J. D.

SOUTH DAKOTA

Aberdeen—Farrell, W. D.

TENNESSEE

Chattanooga—Lake, W. F.
Cornersville—Moffitt, S. A.
Dyer—Jackson, J.
Medling, W. L.
Nashville—Sharp, W. B.

TEXAS

Aransas Pass—Noble, W.
Corsicana—Jester, H. B.
Dallas—Bullington, S. D.
Davis, J. S.
El Paso—Irvin, E. H.
Iredell—Turner, G.
New Braunfels—Hagler, M. C.
Port Arthur—Crumpler, W. E.
Post—Castleberry, G. G.
San Angelo—Kight, J. R.
San Antonio—Ross, R. R.
Waco—Smith, E.

UTAH

Beaver—Shepherd, W. B.
Devils Slide—Dorland, C. E.
Nephi—Rees, N. J.

VERMONT

Montpelier—Burr, C. H.
Lindsay, W.
Rochester—Huntington, W. M.
St. Albans—King, J. S.
Wilder—Goss, R. J.

VIRGINIA

Mathews—Hoskins, R. R.
Richmond—Coleman, C. C.
Roanoke—Saunders, W. H.
Staunton—Thomas, G. H.

WASHINGTON

Elma—Whitty, J. T. W.
Seattle—McDowell, A. E.
Toppenish—Rowland, S. I.

WEST VIRGINIA

Reedy—Gordon, A. T.
Spencer—Staats, H. H.

WISCONSIN

Green Bay—DePierre, A.

WYOMING

Sunrise—Lowe, W.

COMMISSIONS ACCEPTED, U. S. NAVAL RESERVE FORCE

Previous lists published in THE JOURNAL, June 29, July 13, 20 and 27, August 3, 10 and 31 and September 7, 14 and 28.

ALABAMA

Montgomery—McGehee, W. W.
Mertins, P. S.

CALIFORNIA

Holtville—Mosher, W. F.
Los Angeles—Snure, H.
Williams, P. M.
San Francisco—Bohm, J. E.
Harrison, W. H.

COLORADO

Denver—Shea, R. M.

CONNECTICUT

Derby—Treat, W. H.
New Haven—Hoegen, J. A., Jr.
Torrington—Woodhouse, L. W.

GEORGIA

Atlanta—Ballenger, W. L.
Savannah—McDowell, I. W.

INDIANA

Owensville—Montgomery, J. R.

IOWA

Sioux City—Bellaire, R. F.

KANSAS

Rosedale—Whitney, E. L.

LOUISIANA

New Orleans—Faivre, G. W.

MAINE

Lewiston—Scannell, J. W.

MASSACHUSETTS

Boston—Brant, A. T.

MICHIGAN

Engadine—Reese, J. A.
Jackson—Farmer, V. D.

MISSOURI

St. Louis—North, E. P.

MONTANA

Rapelje—Robb, H. F.

NEBRASKA

Wauneta—Bailey, B. G.

NEW JERSEY

Hackensack—Finke, J. H. D.
Trenton—Kent, M. M.

NEW YORK

Albany—Branan, J. H.
Brooklyn—Delany, J. J., Jr.
Palmer, G. H.
Jamaica—Chasick, J. M.
Jamestown—Sackrider, J. R.
New York—Burrows, E. C.
Gaines, J. S., Jr.
Klein, E.
Pike, H.
Schwartz, A.
Smith, J. M.
Van Fleet, J. F.
Norwich—Jennings, W. B.
Syracuse—McGuire, R. J.
Weinheimer, L. H.

NORTH CAROLINA

Concord—Patterson, J. A.
Lumberton—Martin, J. A.

OHIO

Kenton—Wynn, H. R.

PENNSYLVANIA

Farrell—Kelly, R. A.
Philadelphia—Keegan, A. P.
Smith, F. W.
Pittsburgh—Billings, F. T.
Boggs, R. H.
Moyer, R. P.
Weiss, E. A.

TENNESSEE

Chattanooga—Watson, R. B.

TEXAS

Marfa—Darracott, J. C.

VIRGINIA

Richmond—Bowles, J. P.

WASHINGTON

North Seattle—Buschmann, T. W.
North Yakima—Cooper, P. B.
Seattle—Griswold, W. S.
Hopkins, R. T.

COMMISSIONS OFFERED AND ORDERS TO DUTY ON ACCEPTANCE

Alabama

To Camp Sheridan, Ala., Capt. J. E. GARRISON, Birmingham; Lieuts. P. W. HARRIS, Birmingham; L. C. DAVIS, Gordo; H. W. HOWELL, Hamilton; E. E. TAYLOR, Silas.

To Fort Oglethorpe for instruction, Capts. E. T. FIELDS, Ensley; A. W. RALLS, Gadsden; V. H. WILLIAMS, Jasper; Lieut. W. H. BOOZER, Sylacauga.

To Washington, D. C., St. Elizabeth's Hospital, Major G. H. SEARCY, Tuscaloosa.

Arizona

To Camp Cody, N. M., base hospital, Lieut. C. W. ADAMS, Globe.

To Camp Kearney, Calif., Lieut. J. W. BAZELL, Holbrook.

To Camp Logan, Texas, base hospital, for instruction, Capt. N. C. BLEDSOE, Bisbee.

Arkansas

To Camp Beauregard, La., Lieut. E. B. BROWN, Cotton Plant.

To Camp Logan, Texas, Capt. J. E. CASHIN, Dierks.

To Fort Oglethorpe for instruction, Capt. W. L. SHIREY, Foreman; Lieuts. A. C. KOLB, Hope; W. L. SNIDER, J. B. STRACHAM, Hot Springs.

To Fort Riley for instruction, Lieuts. T. A. CLIFTON, Hot Springs; R. L. FRASER, McCrary; S. M. GATES, Monticello; E. B. SWINDLER, Stuttgart.

California

To Camp Cody, N. M., base hospital, Lieut. L. M. ROSE, Santa Clara.

To Camp Fremont, Calif., Lieut. T. F. MADDEN, Sanger. Base hospital, Capts. H. A. HUNTOON, Los Angeles; J. A. NELSON, P. RICE, San Francisco. Base hospital, for instruction, Lieuts. E. R. HANLON, O. F. SCHULLIAN, Los Angeles.

To Camp Kearney, Calif., Capts. L. J. ROTH, Los Angeles; J. C. SILLIMAN, Palo Alto; L. D. GREEN, San Francisco; W. E. SMITH, Whittier; Lieuts. C. C. WAGGONER, Los Angeles; E. M. CLARK, Oakland; J. B. LUCKIE, Pasadena; E. E. EWING, H. R. KING, San Francisco. Base hospital, Capts. E. S. DEPUY, T. REA, Oakland; Lieuts. H. R. BECK, Los Angeles; A. A. ALEXANDER, Oakland; L. D. RIGGS, San Diego. Base hospital, for instruction, Major T. E. BAILEY, San Francisco; Capts. W. F. HOLMAN, Los Angeles; G. H. LILIENCRANTZ, J. H. SAMPSON, Oakland; Lieuts. G. T. MOUNTFORD, Coalinga; H. D. BARNARD, Sacramento.

To Camp Lewis, Wash., Capts. F. R. DeLAPPE, Modesto; S. E. SIMMONS, Sacramento.

To Fort Oglethorpe for instruction, Lieuts. G. P. LATON, Los Angeles; H. A. TODD, Porterville.

To San Francisco, Calif., Letterman General Hospital, Capts. W. T. CLARKE, Los Angeles; D. A. CONRAD, Santa Barbara.

The following order has been revoked: *To Camp Kearney, Calif.*, as assistant to camp surgeon, Capt. C. F. METCALF, South Pasadena.

Colorado

To Azalea, N. C., Lieut. W. V. MULLIN, Colorado Springs.

To Camp Cody, N. M., for instruction, Lieut. T. A. DAVIS, Portland.

To Camp Pike, Ark., base hospital, Capt. J. T. ELLIOTT, Denver.

To Fort Des Moines, Iowa, base hospital, Lieut. S. S. GOLDHAMMER, Denver.

To Fort Oglethorpe for instruction, Capt. F. P. GENGENBACH, Denver.

To Fort Riley, Capt. F. L. WASHBURN, Telluride. For instruction, Capt. T. A. TRIPLETT, Denver; Lieuts. G. F. EWING, Julesburg; A. R. WILLIAMSON, Pueblo. Base hospital, for instruction, Lieut. R. L. CHARLES, Denver.

Connecticut

To Fort Oglethorpe for instruction, Capt. F. F. SIMONTON, Thompsonville.

To Morrison, Va., Lieut. T. A. O'BRIEN, New Haven.

To New Haven, Conn., Yale Army Laboratory School, for instruction, Capt. R. E. BLACK, New London.

District of Columbia

To Camp Lee, Va., Lieut. W. A. MESS, Washington.

To New Haven, Conn., Yale Army Laboratory School, for instruction, Capt. A. M. MacNAMEE, Washington.

Florida

To Camp Joseph E. Johnston, Fla., Capts. B. H. MAYNARD, Lakeland; S. B. STRONG, Palatka; Lieuts. F. A. COPP, Middleburg; J. E. GARNER, Wauchula.

To Camp Sheridan, Ala., base hospital, Capt. R. B. MacFEETERS, Jacksonville.

To Camp Wheeler, Ga., for instruction, Capt. F. J. WAAS, Jacksonville.

Georgia

To Camp Gordon, Ga., base hospital, Capt. R. G. McALILEY, Atlanta.

To Camp Joseph E. Johnston, Fla., Lieuts. P. L. NEVIL, Claxton; T. S. USSERY, Decatur; W. L. ORR, Riverdale.

To Camp Meade, Md., Lieut. W. W. MASSEY, Moultrie.

To Camp Sheridan, Ala., Lieut. S. M. COPELAND, Surrency.

To Fort McPherson, Ga., Lieut. G. L. ECHOLS, Milledgeville.

To Fort Oglethorpe for instruction, Major C. V. WOOD, Cedartown; Capts. J. T. FLOYD, Atlanta; S. D. BROWN, Royston; Lieuts. J. T. STUKES, Americus; J. E. G. GREER, Chattahoochee; J. A. GREEN, Clayton; B. DANIEL, Cordele; C. H. WALKER, Macon; W. H. SUTTON, Midville; E. W. CROCKETT, Sylvester.

Idaho

To Camp Dodge, Iowa, base hospital, for instruction, Lieut. E. W. FOX, Arco.

To Camp Fremont, Calif., base hospital, Lieut. F. A. IRMEN, Buhl.

To Fort Riley for instruction, Capt. J. L. KELLY, Nezperce; Lieut. G. G. ESPE, Rexburg.

Illinois

To Ann Arbor, Mich., State Psychopathic Hospital, Capts. E. BOWE, Jacksonville; O. O. STANLEY, Urbana.

To Camp Custer, Mich., base hospital, Capt. T. W. FLOYD, Peoria.

To Camp Grant, Ill., Lieut. L. GLASSMAN, Chicago. Base hospital, Capts. G. S. DUNTLEY, Bushnell; G. T. JORDAN, Chicago; C. E. MAYOS, East Moline. Base hospital, for instruction, Lieut. R. G. SAVAGE, Oak Park. *To examine the command* for nervous and mental diseases, Lieut. W. G. MURRAY, Jacksonville.

To Camp Meade, Md., Capt. J. C. FURLONG, Spring Grove.

To Camp Pike, Ark., base hospital, for instruction, Lieut. J. T. O'NEILL, Joliet.

To Camp Sevier, S. C., Lieut. M. H. WILKINSON, Dwight.

To Camp Sherman, Ohio, Capt. E. W. BROOKS, Beecher City.

To Camp Wadsworth, S. C., base hospital, Capt. W. W. MELOY, Chicago.

To Camp Zachary Taylor, Ky., base hospital, for instruction, Lieut. L. J. MAY, Anna.

To Fort Oglethorpe for instruction, Capts. W. H. GALLAND, J. M. GRIFFIN, J. MYERS, Chicago; T. A. BRYAN, Mattoon; R. W. OAKLEY, Moline; Lieuts. G. W. WESTERMEIER, Carlinville; H. A. SHAFFER, Charleston; J. A. ABELL, F. L. ANDREWS, V. I. ARMEN, M. J. BADZMIEREWSKI, F. A. LAGORIO, A. E. LEHNER, J. J. McCARTY, Jr., E. F. SLAVIK, J. B. SONNENSCHEIN, L. L. WALLS, W. WILLIAMS, Chicago; W. F. HAGER, Effingham; G. B. BORMANN, Waukegan.

To Fort Riley for instruction, Capts. S. P. HART, Auburn; R. E. GRAVES, Chicago; W. L. FINN, Iuka; A. M. KING, Jacksonville; W. H. PERRY, Sterling; Lieuts. P. K. ANDREWS, Ashmore; L. J. HENSLER, Carrollton; G. J. HALL, Cherry Valley; W. N. GOONE, F. C. HANMORE, J. F. KUCERA, W. M. THOMPSON, Chicago; T. E. CARNEAL, Iuka; J. E. GOODMAN, Pleasant Hill; H. A. CUNNINGHAM, Salem; L. E. HARTWICK, Seymour; W. J. REAM, Spring Valley; C. H. DOWSETT, Woodland; C. S. CAMPBELL, Xenia.

To New Haven, Conn., Capt. G. W. WAGNER, Lieut. R. G. PESCHMAN, Chicago. Yale Army Laboratory School, for instruction, Lieut. L. J. TINT, Chicago.

Indiana

To Camp Dodge, Iowa, base hospital, Capt. W. F. HOWAT, Hammond.

To Camp Grant, Ill., base hospital, Capt. C. BOARDMAN, Gary.

To Camp Jackson, S. C., base hospital, for instruction, Lieut. C. E. COX, Indianapolis.

To Camp Sherman, Ohio, base hospital, Capt. O. E. McWILLIAMS, Anderson; J. R. GILLUM, Terre Haute.

To Fort Des Moines, Iowa, base hospital, Capt. L. Z. BREAKS, Terre Haute.

To Fort Oglethorpe for instruction, Capts. E. A. BROWN, E. F. KISER, Indianapolis; C. S. HOUGLAND, Milroy; F. E. WOLFE, New Albany; F. H. GREEN, Rushville; Lieuts. H. P. LONG, Dillsboro; C. J. ROTHSCHILD, Fort Wayne; H. W. COX, Indianapolis; C. E. JUMPER, Terre Haute.

To Fort Riley for instruction, Capt. C. W. ASBURY, Hymera; Lieuts. A. C. CHENOWETH, Andrews; F. M. BIDDLE, Battle Ground; J. B. MOSER, Bloomington; W. D. BRETZ, Huntingburg; R. J. D. PETERS, Indianapolis; T. M. SMITH, Marysville; R. O. KENNEDY, Milroy; H. M. CROWE, South Bend.

To New Haven, Conn., Lieut. C. J. STEVENS, Rockville.

To Washington, D. C., Surgeon-General's Office, Capt. C. ROGERS, Indianapolis.

Iowa

To Camp Pike, Ark., for instruction, Lieut. C. C. LYTLE, Lansing.

To Fort Oglethorpe for instruction, Capts. H. A. WHITE, Clinton; W. A. DUNLAP, R. R. MORDEN, Des Moines; Lieuts. P. A. PARK, Atkins; T. A. BURKE, Mason City.

To Fort Riley, Capt. R. H. GREGORY, Creston. For instruction, Capts. G. T. McDOWELL, Gladbrook; F. F. EBERSOLE, Mount Vernon; Lieuts. C. S. HICKMAN, Centerville; R. W. PRATHER, Des Moines; G. E. SNEARLY, Goodell; J. R. BLACK, Jefferson; G. G. GIBSON, Lehigh; G. S. WESTLY, Manly; B. B. EVERALL, Monona; M. O. STAUCH, Whiting.

Kansas

To Camp Beauregard, La., base hospital, for instruction, Capt. G. F. ZERZAN, Holyrood.

To Camp Bowie, Texas, base hospital, for instruction, Capt. R. R. NEVITT, Mildred.

To Camp Cody, N. M., base hospital, Capt. J. W. SIMMONS, Salina.

To Camp Pike, Ark., base hospital, for instruction, Lieut. G. A. KING, Maplehill.

To Fort Oglethorpe for instruction, Lieuts. A. J. WEDEL, Hesston; C. MAYFIELD, Hutchinson; C. C. FUNK, Smith Center.

To Fort Riley, base hospital, Lieut. W. P. CALAHAN, Wichita. For instruction, Capts. C. A. FISHER, Fontana; C. F. McNAIR, Haven; E. L. ASBELL, Kansas City; J. S. FULTON, Kiowa; E. LIEURANCE, Neosha Falls; Lieuts. H. RICHERT, Goessel; P. F. WESLEY, Havi-

land; P. C. ANDERS, Hays; W. E. MICHENER, Ottawa; O. C. LOWE, Paola; L. S. FISHER, Raymond; G. H. GRIEVE, Turon.

To New Haven, Conn., Yale Army Laboratory School, for instruction, Capt. H. N. MOSES, Salina.

Kentucky

To Camp Greene, N. C., Capt. L. S. SILER, Woodbine.

To Camp Hancock, Ga., base hospital, for instruction, Capt. J. R. COWAN, Danville.

To Camp Jackson, S. C., Capt. J. I. SMITH, London; Lieut. C. L. HANCOCK, Smithfield.

To Camp Shelby, Miss., base hospital, for instruction, Lieut. J. F. MORGAN, Cynthiana.

To Camp Sherman, Ohio, base hospital, for instruction, Lieut H. TYLDESLEY, Central City.

To Camp Zachary Tayor, base hospital, Capt. J. W. SCOTT, Lexington; Lieut. W. D. LEVI, Louisville.

To Fort Oglethorpe for instruction, Capts. W. M. RUSH, Buechel; E. T. GRASSER, Louisville; S. S. FOSS, Valley Station; Lieuts. D. R. BOTKIN, Hazard; T. J. CRICE, H. G. HARTMAN, H. M. RUBEL, Louisville; C. H. JONES, Lynn Grove; J. R. McGARY, Owensboro.

To Fort Riley for instruction, Capt. C. C. ENGLISH, Lieut. W. H. EMRICH, Louisville.

Louisiana

To Camp Beauregard, La., Lieut. L. T. LANE, Reids.

To Camp Joseph E. Johnston, Fla., Lieut. J. W. PHILLIPS, Boyce.

To Camp Shelby, Miss., base hospital, Lieut. E. A. HOGAN, New Orleans.

To Camp Sheridan, Ala., Lieut. W. L. LITTON, Belmont.

Maine

To Camp Devens, Mass., base hospital, Capt. F. Y. GILBERT, Portland.

To Camp Greene, N. C., Lieut. C. F. TRAYNOR, Biddeford.

To Camp Jackson, S. C., Lieut. J. G. HUTCHINS, Camden.

To Fort Oglethorpe for instruction, Capt. H. W. SAMPSON, Monson; Lieuts. I. B. GAGE, Atlantic; L. O. ROY, Lewiston.

Maryland

To Camp Jackson, S. C., base hospital, Capt. T. P. SPRUNT, Baltimore.

To Camp Meade, Md., Lieut. G. S. M. KIEFFER, Baltimore. Base hospital, for instruction, Capt. J. R. B. BRANCH, Baltimore.

To Camp Sevier, S. C., Capt. I. J. SPEAR, Baltimore.

To Fort Oglethorpe for instruction, Lieuts. R. Z. G. CROSS, R. W. EBE, M. L. RAEMORE, A. L. RETTALIATA, F. C. WARRING, Baltimore; H. C. HESS, Govans.

To New Haven, Conn., Lieut E. J. LEOPOLD, Baltimore.

Massachusetts

To Camp Devens, Mass., Lieut. H. L. McDONALD, Attleboro. Base hospital, for instruction, Capt. W. S. BUCKLEY, Boston.

To Camp Dix, N. J., base hospital, Capt. W. H. McMANN, Boston.

To Camp Greene, N. C., Capt. D. F. MacDONALD, Taunton.

To Camp Jackson, S. C., base hospital, Major G. S. C. BADGER, Boston; Capt. C. E. STREET, Springfield.

To Camp Lee, Va., Capt. E. V. HARTWICK, Dorchester.

To Camp Meade, Md., Lieut. A. W. BERR, Lawrence.

To Camp Sevier, S. C., Lieut. D. J. ELLISON, Lowell.

To Camp Wadsworth, S. C., Lieuts. R. R. ROOT, Georgetown; W. L. QUENNELL, Tewksbury.

To Fort Oglethorpe for instruction, Capts. G. M. MASON, Boston; T. E. CAVANAUGH, Holyoke; W. L. HOARN, Lynn; R. W. GUILER, Newton; F. R. CLARK, Newtonville; E. J. DAILEY, Somerville; J. N. BOYER, E. C. SULLIVAN, E. J. SWEENEY, Springfield; Lieuts. E. W. SMALL, Belmont; E. R. GOOKIN, E. D. HARTNETT, J. H. ROOT, R. F. SHELDON, Boston; H. B. DUNHAM, Brockton; A. W. SLATE, Indian Orchard; W. F. DOLAN, Quincy; G. V. HIGGINS, Randolph; H. C. GERRARD, Springfield; O. S. MAYHEW, Vineyard Haven; P. A. DEVANEY, Waverly; C. BAKER, Worcester.

To New Haven, Conn., Capt. J. P. TREANOR, Boston; Lieut. R. MORGAN, Westfield.

To Plattsburg Barracks, N. Y., Capt. B. T. BURLEY, Worcester.

To Walter Reed General Hospital, D. C., Capt. F. A. BARDWELL, Boston.

Michigan

To Camp Jackson, S. C., Lieut. C. R. W. SOUTHWICK, Partello.

To Fort Oglethorpe for instruction, Capts. O. WHITNEY, Adrian; P. B. TAYLOR, C. A. WOODRUFF, Detroit; W. H. ENDERS, Jackson; Lieuts. L. P. SCHROEDER, Calumet; F. E. REEDER, Flint.

To Fort Riley for instruction, Lieuts. F. W. GOTTSCHALK, Detroit; B. R. SLEEMAN, Linden.

Minnesota

To Camp Dodge, Iowa, base hospital, Capts. G. F. BROOKS, Hibbing; C. D. FREEMAN, St. Paul. Base hospital, for instruction, Lieut. C. A. TRAEGER, Faribault.

To Camp Pike, Ark., base hospital, for instruction, Lieut. S. V. HODGE, Minneapolis.

To Fort Oglethorpe for instruction, Lieuts. A. H. SCHWARTZ, Duluth; W. M. EMPIE, Virginia.

To Fort Riley for instruction, Lieuts. H. O. RUDD, Fosston; J. D. WATSON, Holdingford; F. L. HAMMERSTRAND, Sacred Heart; M. L. LARSON, W. R. McCARTHY, C. WOOLSON, St. Paul.

Mississippi

To Camp Beauregard, La., Lieut. J. J. WILSON, Coldwater.

To Camp Joseph E. Johnston, Fla., Lieut. R. N. S. YOUNG, Brooklyn.

To Camp Sheridan, Ala., Capt. J. D. SMITH, Laurel; Lieut. G. W. BOUNDS, Meehan Junction.

To Fort McPherson, Ga., Capt. W. W. SMITHSON, Jackson; Lieuts. S. J. GADDY, Sumrall; G. C. HARALSON, Vicksburg.

To Fort Oglethorpe for instruction, Capt. V. A. LEA, Gloster; Lieut. L. B. HUDSON, Hattiesburg.

Missouri

To Camp Doniphan, Okla., Lieut. E. P. MONAHAN, Kansas City.

To Camp Lee, Va., base hospital, Lieut. J. A. PRINGLE, St. Louis.

To Camp Logan, Texas, Lieut. R. M. WINN, Hannibal.

To Camp MacArthur, Texas, Lieut. J. W. WINN, Higbee.

To Camp Pike, Ark., base hospital, Lieut. V. W. McCARTY, Kansas City. Base hospital for instruction, Lieut. M. PITZMAN, St. Louis.

To Des Moines, Iowa, base hospital, Lieut. E. E. HEIN, St. Louis.

To Fort Oglethorpe for instruction, Capts. O. W. BUTLER, H. B. DAVIS, F. J. HATCH, T. T. SAWYER, Kansas City; E. W. STACY, Princeton; C. A. GOOD, J. M. DOYLE, St. Joseph; Lieuts. R. CALLAGHAN, J. E. RAY, Kansas City; J. C. FLEISCHMAN, St. Louis.

To Fort Riley, Capt. A. C. KIMBALL, St. Louis; Lieuts. G. W. HORROM, Rolla; R. T. MULFORD, St. Louis. For instruction, Capts. J. F. MacKEY, Kansas city; C. S. BLACKMAN, Parma; C. H. WERNER, St. Joseph; Lieuts. F. H. EMMONS, Auxvasse; S. L. DURHAM, Dearborn; O. R. CROOKS, C. G. PARMENTER, E. L. RUBLE, C. A. SHERMAN, Kansas City; C. H. BULKLEY, La Plata; M. W. ROGERS, Princeton; G. R. STEVENSON, St. Joseph; S. J. KING, R. TURNER, St. Louis.

To New Haven, Conn., Yale Army Laboratory School, for instruction, Major D. L. HARRIS, St. Louis; Lieut. J. D. JACKSON, Kansas City.

To report to the commanding officer, Central Department, Capt. R. L. MOUNT, Polo.

Montana

To Camp Dodge, Iowa, base hospital, for instruction, Capt. G. L. CHAPMAN, Great Falls.

To Fort Oglethorpe for instruction, Capt. S. E. SCHWARTZ, Butte.

Nebraska

To Camp Dodge, Iowa, base hospital, Capt. H. B. LANDIS, Broken Bow. Base hospital, for instruction, Lieut. H. P. WEKESSER, Lincoln.

To Camp Logan, Texas, base hospital, Capt. J. B. McPHERSON, Hastings.

To Camp Pike, Ark., for instruction, Capt. G. E. WILLIAMS, Havelock.

To Denver, Colo., Capt. L. R. JONES, Scotts Bluff.

To Fort Oglethorpe for instruction, Capts. W. H. HEINE, Hooper; F. A. LEMAR, Humphrey; Lieut. R. L. SMITH, Lincoln.

To Fort Riley for instruction, Lieuts. A. A. TYRRELL, Beatrice; R. F. DECKER, Byron; G. A. DES JARDIN, Lincoln.

Nevada

To Camp Pike, Ark., for instruction, Capt. F. C. PACHE, Mina.

New Hampshire

To Camp Jackson, S. C., Lieut. E. J. DELANEY, Concord.

To Fort Oglethorpe for instruction, Capt. E. A. TRACY, Keene; Lieut. E. D. MIVILLE, Manchester.

To Mineola, N. Y., Hazelhurst Field, Lieut. L. R. BURNETT, Peterboro.

To Morrison, Va., Lieut. H. B. HAZEN, Lebanon.

New Jersey

To Camp Dix, N. J., base hospital, Capts. B. MORGAN, Bloomfield; M. A. SHANGLE, Elizabeth; G. W. SHERA, Jersey City.

To Camp Greene, N. C., Lieut. H. F. TIDWELL, Jersey City. For instruction, Lieut. J. WILLIS, Jr., Jersey City.

To Camp Holabird, Md., Capt. F. A. FINN, Jersey City.

To Camp Jackson, S. C., base hospital, Lieut. T. J. E. HOLMES, Paterson.

To Camp Lee, Va., base hospital, for instruction, Capt. G. MILLS, Morristown.

To Camp McClellan, Ala., for instruction, Capt. T. A. DINGMAN, Paterson.

To Camp Meade, Md., base hospital, Capt. G. B. V. WILKINSON, Morristown.

To Camp Sevier, S. C., Capt. G. W. FITCH, Asbury Park; Lieuts. E. D. McGIVERIN, J. L. ROSENSTEIN, Jersey City; S. HIRSCHBERG, Newark.

To Camp Shelby, Miss., base hospital, Capt. F. H. TODD, Paterson.

To Fort Oglethorpe for instruction, Capts. P. B. THOMPSON, Bloomfield; C. L. DECKER, J. I. FORT, Newark; Lieuts. J. W. HUGHES, Atlantic City; J. G. L. BORGMEYER, Bayonne; T. H. PLATT, Dunellen; R. B. THOMAS, G. D. WHITE, Jersey City; M. WEGMAN, Newark; G. J. VAN SCHOTT, Passaic; H. E. BRIODY, J. J. GREENGRASS, Paterson; W. J. HUDSON, Pleasantville; W. A. RULLMAN, Red Bank; E. S. BLACK, Williamstown.

To New Haven, Conn., Yale Army Laboratory School, for instruction, Lieut. H. E. BURBANK, Belleville.

To Washington, D. C., St. Elizabeth's Hospital, Capt. P. C. WASHBURN, Cape May Court House.

To Williamsbridge, N. Y., Capt. C. R. O'CROWLEY, Newark.

New Mexico

To Camp Cody, N. M., as tuberculosis examiner, Lieut. S. H. JAMES, Lordsburg.

New York

To Azalea, N. C., Capt. W. M. MEHL, Buffalo.

To Camp A. A. Humphreys, Va., base hospital, Lieut. M. RASHBAUM, New York.

To Camp Custer, Mich., base hospital, Capt. T. F. FOLEY, Elmira.

To Camp Devens, Mass., Lieut. E. M. POATE, New York. Base hospital, Lieuts. S. J. LIEBMAN, V. A. NARDIELLO, New York.

To Camp Dix, N. J., base hospital, Capt. B. SAMUELS, New York; Lieut. F. J. McMENAMIN, Oneonta. *To examine the command* for nervous and mental diseases, Lieut. H. A. OSSERMAN, New York.

To Camp Gordon, Ga., base hospital, Lieut. W. H. CONKLIN, New York.

To Camp Holabird, Lieuts. F. M. ROCHFORD, Brooklyn; H. C. SENKE, Geneseo.

To Camp Jackson, S. C., Lieuts. F. N. BIBBY, L. M. LESSER, New York; J. V. HIBBARD, Olive Bridge. Base hospital, Capts. W. E. CALDWELL, H. A. GRIFFIN, New York.

To Camp Lee, Va., Lieut. F. J. MacDONALD, Schenectady. Base hospital, Capt. F. W. MANLY, Naples; Lieut. A. L. OBERDORFER, New York. Base hospital, for instruction, Lieut. J. W. McCHESNEY, Baldwin.

To Camp McClellan, Ala., base hospital, Capt. J. J. KING, New York.

To Camp Meade, Md., Capt. L. C. BEEBE, Hamilton; Lieuts. C. H. TOPPING, Jefferson; R. J. LYNCH, Otisville. Base hospital, Capt. W. J. HEIMANN, New York.

To Camp Sevier, S. C., Lieuts. L. C. WARREN, Franklin; D. ELLNER, New York; W. A. MINOR, Utica. Base hospital, Lieut. D. W. JENNINGS, Catskill. Base hospital for instruction, Capt. W. E. BOWEN, Rochester.

To Camp Sherman, Ohio, Lieut. I. TRACHTENBERG, New York.

To Camp Wadsworth, S. C., Capt. H. J. VARY, Rochester; Lieut. A. WELLER, New York.

To Fort Oglethorpe for instruction, Capts. L. B. MOUNT, Albany; J. S. DORIAN, Brooklyn; P. J. CANDEE, Buffalo; L. B. HONEYFORD, Catskill; E. M. GRIFFITH, Chadwicks; M. M. LUCID, Cortland; G. LINDSAY, Freeport; W. H. CANTLE, Mamaroneck; L. W. CALLAN, C. J. DILLON, E. S. GUSHEE, F. X. PIDGEON, P. S. SABINE, New York; J. H. FINNESSY, W. H. SUTHERLAND, Rochester; P. E. GARLOCK, Schenectady; E. C. REIFENSTEIN, Syracuse; G. H. DILL, Utica; N. L. HAWKINS, Watertown; C. C. ZACHARIE, White Plains; Lieuts. A. E. CORDES, L. T. FRICKE, D. LIVINGSTONE, Brooklyn; A. H. CLARK, R. C. FISHER, Buffalo; A. C. COMBES, Elmhurst; M. F. HALL, Elmira; H. C. MANN, Holland; J. F. BOURKE, Jamaica; F. W. DALRYMPLE, New Rochelle; H. L. BALAMUTH, H. BLUM, A. BROOKS, R. T. COREY, L. W. CROSSMAN, A. F. A. DOOLING, D. I. FREY, J. S. HEIMAN, J. A. KELLER, I. J. LEVY, S. MILBANK, S. J. RAPHAELSON, S. SHEIFER, M. K. SMITH, New York; D. H. MILLS, Oneonta; E. F. STEWART, Ozone Park; R. W. MOE, Peekskill; E. H. BURNES, F. J. COLGAN, M. HOLTZ, H. L. PRINCE, E. R. REYNOLDS, G. B. VAN ALSTYNE, G. V. VETTER, Rochester; T. A. HULL, Troy.

To Lakewood, N. J., Lieut. L. L. SHAPIRO, New York.

To Mineola, N. Y., Hazelhurst Field, for instruction, Capts. A. J. BEDELL, Albany; E. P. HALL, Syracuse.

To Morrison, Va., Lieut. F. GAUCH, Brooklyn.

To New Haven, Conn., Lieuts. H. E. COHEN, E. L. CREEDEN, C. C. HAINES, G. G. HATZEL, J. KRANER, New York; V. M. PARKINSON, Wilton. Yale Army Laboratory School for instruction, Lieuts. M. LEDERER, T. S. WINSLOW, New York.

To New York, Neurological Institute, for instruction, Lieuts. H. S. BULL, Auburn; J. MARSHACK, I. J. SANDS, New York.

To Plattsburg Barracks, N. Y., Capt. T. E. BAMFORD, Syracuse.

To report to the commanding officer, Eastern Department, Capt. C. R. BAKER, Kingston.

To Walter Reed General Hospital, D. C., Major D. L. ROSS, White Plains.

To Washington, D. C., St. Elizabeth's Hospital, Capt. A. E. SOPER, New York.

North Carolina

To Camp Sevier, S. C., Capt. W. F. COLE, Greensboro.

To Fort Oglethorpe for instruction, Lieut. W. M. WILLIS, Farmville.

North Dakota

To Camp Grant, Ill., base hospital, for instruction, Capt. R. R. HOGUE, Linton.

To Fort Oglethorpe for instruction, Capt. A. A. WHITTEMORE, Bowman.

To Fort Riley for instruction, Capts. A. D. McCANNEL, Minot; G. W. CALLERSTROM, Northwood.

Ohio

To Ann Arbor, Mich., State Psychopathic Hospital, Lieut. V. ADAIR, Lorain.

To Army Medical School for instruction, Lieut. I. B. SMOCK, Canton.

To Camp Beauregard, La., base hospital, for instruction, Capt. C. A. HOWELL, Columbus.

To Camp Dodge, Iowa, base hospital, Capt. R. B. McLAUGHLIN, Centerburg; Lieut. H. G. BEATTY, Columbus.

To Camp Greene, N. C., base hospital, for instruction, Lieut. B. B. BRIM, Toledo.

To Camp Jackson, S. C., Lieuts. B. R. MILLER, Tiffin; H. L. PROUTY, West Unity. Base hospital, for instruction, Lieut. C. J. ALTMAIER, Marion.

To Camp Lee, Va., Lieut. F. R. CLEMSON, Thornville.

To Camp Meade, Md., Lieut. G. D. BLACK, Toledo.

To Camp Sevier, S. C., base hospital, for instruction, Lieut. D. H. PATTERSON, Cleveland.

To Camp Sheridan, Ala., base hospital, Capt. A. D. KNISELY, Lima.

To Camp Sherman, Ohio, Lieuts. K. H. CHANDLER, W. E. TREGO, Cleveland; W. C. MARTIN, Monroeville. Base hospital, Capt. H. R. GEYER, Zanesville; Lieuts. W. O. BONSER, Toledo; C. G. McPHERSON, Xenia. *To examine the command* for nervous and mental diseases, Lieut. C. H. CREED, Columbus.

To Camp Wadsworth, S. C., base hospital, Lieut. C. R. STEINKE, Akron.

To Camp Zachary Taylor, Ky., to examine the command for nervous and mental diseases, Capt. W. RAVINE, Cincinnati.

To Fort Oglethorpe for instruction, Capts. E. R. SCHOOLFIELD, Bucyrus; C. D. SLAGEL, Centerville; F. M. BURNS, Cincinnati; J. B. AUSTIN, S. W. EVANS, E. H. SEASON, Cleveland; J. B. URY, Defiance; W. H. RADBERMAN, Forest; E. S. PROTZMAN, Kenton; O. S. STEINER, Lima; C. B. MESSERLY, Martins Ferry; R. H. QUICK, Toledo; Lieuts. J. L. JONES, Akron; A. N. VANDEMAN, Bellbrook; L. D. STONER, Canton; W. D. MOCCABEE, Cardington; S. R. BAME, Carey; W. H. THOMPSON, Celina; J. J. CONZETT, E. HAHN, W. S. KAUTZ, Cincinnati; E. G. KUHLMAN, Cleveland; M. D. GODFREY, L. F. LAUFERSWEILER, Columbus; W. W. MANNHARDT, Custar; L. R. ELLARS, Dayton; E. J. LAUBER, Defiance; C. SMITH, Elida; T. P. FAST, Grover Hill; A. W. ANDERSEN, Lakewood; I. G. WHITACRE, Lodi; R. S. DOMBAUGH, Marion; W. A. STOUTENBOROUGH, Mechanicsburg; T. QUINN, Napoleon; L. L. FROCK, New Berlin; A. F. BURSON, Oakwood; K. G. EVANS, Payne; R. D. SPENCER, Piqua; F. G. SMITH, Reily; F. W. CONLEY, Sherwood; T. W. MAHONEY, Springfield; H. E. BRAILEY, Swanton; R. M. CAMPBELL, J. STAMM, E. S. WENDT, Toledo; E. G. REPLOGLE, Versailles; T. A. CAMPBELL, Wapakoneta; F. F. DeVORE, Whitehouse; W. E. HIGGS, A. M. ROSENBLUM, Youngstown.

To Morrison, Va., Lieut. P. M. PATTERSON, Toledo.

To New Haven, Conn., Yale Army Laboratory School, for instruction, Lieut. H. F. ROHRS, Napoleon.

To Washington, D. C., Capt. J. M. BESSEY, Toledo.

Oklahoma

To Camp Bowie, Texas, base hospital, Capt. L. A. HAHN, Guthrie.

To Camp John Wise, Texas, Lieuts. A. E. BALLARD, Madill; H. A. JERGESEN, Tulsa.

To Camp Logan, Texas, Capt. J. B. CLARK, Coalgate; Lieuts. E. GUINN, Antlers; J. M. WATSON, Lamont; E. F. HURLBUT, Meeker; J. M. LANNING, Muskogee; L. E. PEARSON, Reed; G. C. CAMPBELL, Sand Springs; R. G. McDONOUGH, Tulsa.

To Fort Oglethorpe for instruction, Capt. D. F. COLDIRON, Red Rock; Lieuts. H. WRIGHT, Grandfield; J. M. FEWKES, Gray; J. P. GAY, McAlester; W. O. HARTSHORNE, Spiro.

To the governor of the Panama Canal, Lieut. C. M. DRIVER, Mounds.

Oregon

To Camp Kearney, Calif., Capt. O. C. HAGMEIER, Seaside.

To Camp Lewis, Wash., Lieut. F. G. HEWETT, Independence. Base hospital, Capts. F. M. BROOKS, R. E. L. HOLT, Portland; Lieut. E. B. STEWART, Roseburg.

To Fort Riley for instruction, Lieut. E. D. LAMB, Union.

Pennsylvania

To Camp Custer, Mich., base hospital, for instruction, Capt. H. R. DECKER, Pittsburgh.

To Camp Dix, N. J., Lieut. J. F. DORAN, Wilkinsburg. Base hospital, Lieut. W. L. CARISS, Philadelphia.

To Camp Gordon, Ga., base hospital, for instruction, Capt. J. E. GOTWALS, Phoenixville.

To Camp Greene, N. C., base hospital, Capt. F. O. LEWIS, Philadelphia.

To Camp Jackson, S. C., Lieuts. G. M. DICKSON, Adamsburg; J. B. FEELEY, Glassport. Base hospital, Capt. S. A. S. METHENY, Philadelphia.

To Camp Lee, Va., base hospital, Lieut. G. H. MOORE, Schuylkill Haven.

To Camp Meade, Md., Lieuts. H. I. SHOENTHAL, New Paris; W. W. POULSON, Philadelphia; S. P. BOYER, Pittsburgh; G. K. LEVAN, Reading; T. E. McMURRAY, Wilkinsburg. Base hospital, Lieut. E. S. WEIMER, Pittsburgh.

To Camp Sheridan, Ala., base hospital, Capt. L. M. GURLEY, Johnston; Lieut. W. D. GRIESEMER, Reading.

To Camp Sherman, Ohio, to examine the command for nervous and mental diseases, Lieut. J. C. FULMER, Williamsport.

To Camp Wadsworth, S. C., base hospital, Lieut. M. R. DINKELSPIEL, Wilkes-Barre.

To Fort McPherson, Ga., Lieut. J. O. BOWER, Wyncote.

To Fort Oglethorpe for instruction, Capts. W. E. FINE, Ambler; S. P. GRAY, Chester; S. CHANDLER, M. F. PERCIVAL, W. S. WRAY, Philadelphia; R. S. HENSELL, C. A. HILL, Pittsburgh; Lieuts. D. T. DITCHBURN, Arnot; J. H. BURKARTMAIER, Avondale; A. H. ZIEGLER, Butler; W. C. ROHRKASTE, Dormont; R. C. SEIPEL, Easton; W. E. HODGSON, Glassport; G. R. BLACKBURN, Greensburg; J. A. CORRIGAN, Hazleton; J. L. FOSTER, Hoboken; M. A. BARBOUHR, Johnstown; E. E. CLARK, Knoxville; J. C. DEAL, W. H. HAINES, C. F. LEONARD, R. R. SAUNDERS, Philadelphia; C. A. HAUCK, J. R. JOHNSTON, E. C. McADAMS, Pittsburgh; C. K. KISTLER, Reading; L. D. HEIM, Schuylkill Haven; W. E. CAMPBELL, Sharon; G. E. CRAMER, W. C. DIESS, Sharpsburg.

To Morrison, Va., Lieuts. G. T. FOX, Bristol; W. E. BOYER, Williamsport.

To New Haven, Conn., Capt. W. M. HAMILTON, Elrama. Yale Army Laboratory School, for instruction, Lieut. A. G. SANDBLAD, McKeesport.

To Walter Reed General Hospital, D. C., Capt. J. M. REED, Pittsburgh.

Porto Rico

To Camp Las Casas, P. R., Lieut. G. E. BIRD, Carolina.

Rhode Island

To Fort Oglethorpe for instruction, Lieuts. E. L. MYERS, W. C. ROCHELEAU, Woonsocket.

South Carolina

To Camp Gordon, Ga., base hospital, Capt. S. B. FISHBURNE, Columbia.

To Camp Jackson, S. C., Capt. J. I. BARRON, York. Base hospital, Major W. WESTON, Jr., Columbia.

To Camp Lee, Va., Lieut. W. L. BYERLY, Hartsville.

To Fort Oglethorpe for instruction, Capts. J. W. DAVIS, Clinton; C. N. RAKESTRAW, Rock Hill; Lieut. B. D. CAUGHMAN, Columbia.

South Dakota

To Camp Dodge, Iowa, base hospital, Capts. J. E. SCHWENDENER, Bryant; F. M. BALDWIN, Redfield.

To Fort Riley, base hospital, for instruction, Lieut. W. P. COLLINS, Howard.

Tennessee

To Camp Sevier, S. C., Lieut. C. S. KINZER, Kingsport.

To Camp Shelby, Miss., base hospital, Capt. B. D. AUSTIN, Nashville.

To Camp Wheeler, Ga., base hospital, for instruction, Capt. J. W. JOHNSON, Chattanooga.

To Camp Zachary Taylor, Ky., to examine the command for nervous and mental diseases, Lieut. L. E. TRENT, Nashville.

To Fort Oglethorpe for instruction, Capts. J. R. W. FOWLKES, Greenfield; W. J. MATTHEWS, Johnson City; M. M. COPENHAVER, Knoxville; J. H. DYER, Wartrace; W. L. HENDERSON, Woodstock; Lieuts. H. Q. FLETCHER, B. L. JACOBS, Chattanooga; G. B. ALDER, Coalmont; W. P. HOLLOWAY, Covington; V. D. KING, Memphis; H. S. SMYTHE, Mountain City; C. G. GRIFFIN, Nashville; C. B. A. TURNER, Newbern.

Texas

To Camp Bowie, Texas, base hospital, Capt. H. T. AYNESWORTH, Waco.

To Camp Logan, Texas, Major A. B. KENNEDY, Bonham; Capts. B. E. BRASSELTON, Bridgeport; R. H. GOUGH, Fort Worth; Lieuts. W. C. GOULD, Bells; J. B. LATHAM, Blackwell; W. B. SAUNDERS, Brashear; K. C. KNOLLE, Brenham; J. H. STEPHENSON, Dallas; J. R. HARRIS, Everman; S. A. LUNDY, A. J. MULLENNIX, Fort

Worth; A. A. SPEEGLE, Palestine; R. A. WILSON, Pontotoc; R. R. DAVIS, Three Rivers. Base hospital, Capt. H. L. WARWICK, Fort Worth; Lieut. S. H. GRANT, Deport. Base hospital, for instruction, Lieut. G. G. WYCHE, Iago.

To Camp MacArthur, Texas, Lieuts. C. E. FARRELL, Edgewood; J. R. HUNTER, El Paso; E. D. SHIPMAN, Purmela. Base hospital, Lieut. D. L. BETTISON, Dallas. Base hospital, for instruction, Lieut. J. S. CALHOUN, Dallas.

To Camp Travis, Texas, base hospital, Lieut. B. N. ARD, Dallas.

To Fort Bayard, Texas, Capt. C. W. COUTANT, San Antonio.

To Fort Oglethorpe for instruction, Major E. V. DE PEW, San Antonio; Capts. S. R. MILLIKEN, Dallas; A. L. LANE, Wichita Falls; Lieuts. J. S. TOMKIES, Dallas; J. M. DOSS, Flint; G. W. COVINGTON, Fort Worth; M. R. SHARP, Granger; W. P. HARRISON, Teague; G. G. BELL, Tyler.

To Fort Riley for instruction, Lieut. B. R. CARPENTER, Clifton.

To Fort Sam Houston, Texas, base hospital, Lieut. J. R. MIDDLEBROOK, Alpine.

To Fort Worth, Texas, Talliaferro Field, Lieut. W. T. McREA, Ennis.

To Leon Springs, Texas, Lieut. H. A. GILLIAM, Lamesa.

Utah

To Camp Cody, N. M., base hospital, Lieut. R. M. BROWN, Ogden.

To Camp Kearney, Calif., Capt. E. E. HINCKLEY, Salt Lake City.

To Fort Riley for instruction, Lieut. W. H. BASH, Sunnyside.

Vermont

To Fort Oglethorpe for instruction, Lieuts. D. J. CARROLL, Vergennes; D. S. DRAKE, White River Junction.

Virginia

To Camp Greene, N. C., base hospital, Capt. J. W. C. JONES, Newport News.

To Camp Joseph E. Johnston, Fla., Lieut. J. W. MARTIN, Richmond.

To Camp Meade, Md., Lieut. T. A. WILLIAMS, Middletown.

To Camp Sevier, S. C., Lieut. R. W. WOODHOUSE, Jr., Virginia Beach.

To Camp Wadsworth, S. C., Lieuts. W. R. CULBERTSON, Coeburn; W. H. EVANS, Lynchburg.

To Camp Wheeler, Ga., Lieut. C. A. AMOS, Rosemont.

To Camp Zachary Taylor, Ky., base hospital, Lieut. D. P. WEST, Norfolk.

To Fort Oglethorpe for instruction, Lieuts. L. P. TAYLOE, Orange; H. G. JOHNSON, Pearisburg; J. D. WILLIS, Roanoke; J. A. OWEN, South Boston.

To Newport News, Va., Lieut. R. L. HUDNALL, Beverlyville.

The following order has been revoked: *To Hoboken, N. J.,* Lieut. F. M. HORSLEY, Lovington.

Washington

To Camp Kearney, Calif., Capts. G. E. MURPHY, Olympia; W. H. APPLETON, Spokane; Lieuts. W. K. COCKLIN, Moxee City; W. A. MILLINGTON, Onalaska; B. F. BROOKS, Sedro Woolley; W. E. FORDYCE, Sunnyside.

To Camp Lewis, Wash., Lieuts. R. L. ROSS, Mineral; H. J. HARDS, Tacoma. Base hospital, for instruction, Lieut. H. C. COWAN, Walla Walla.

To San Francisco, Calif., Lieut. C. E. YOUNG, Rimrock.

West Virginia

To Camp Colt, Pa., Lieut. M. N. MASTIN, Piedmont.

To Camp Greene, N. C., Lieut. A. L. AMICK, Charleston.

To Camp Meade, Md., Lieuts. C. G. STROUD, Erbacon; O. V. BROOKS, Moorefield; V. L. NOE, Newton; T. GILLESPY, Wheeling.

To Camp Sevier, S. C., base hospital, Capt. O. B. BEER, Buckhannon.

To Fort Oglethorpe for instruction, Capts. W. J. LEAHY, Mannington; M. D. CURE, Weston; T. SLAYDEN, Williamson; Lieuts. W. J. THOMAS, Accoville; H. H. ESKER, Clarksburg; H. A. ROSENTHAL, Gypsey; R. C. MITCHELL, Junier.

To Morrison, Va., Lieut C. M. KIMBLE, Austen.

Wisconsin

To Camp Jackson, S. C., base hospital, Capt. A. J. PATEK, Milwaukee.

To Camp Meade, Md., Lieut. V. G. FOLEY, Wauwatosa.

To Camp Pike, Ark., for instruction, Lieut. A. YAFFE, Milwaukee.

To Fort Oglethorpe for instruction, Capts. W. A. PROUTY, Burlington; C. A. FIDLER, Milwaukee; R. W. JONES, Wausau; Lieuts. E. S. McNEVINS, Green Bay; J. J. HEFFRON, Milwaukee.

To Fort Riley, Capt. L. W. SAYLES, Baraboo. For instruction, Lieuts. G. E. BILSTAD, Cambridge; A. M. CHRISTOFFERSON, Colby; J. E. DONNELL, Cuba City; F. P. MARSHALL, Fond du Lac; F. L. CRIKELAIR, Green Bay; S. W. MURPHY, Kenosha; H. E. SCHMIDT, Milwaukee; C. M. SCHULDT, Platteville; J. A. COX, Wautoma.

To Mineola, N. Y., Hazelhurst Field, for instruction, Lieut. V. L. SIMONES, La Crosse.

Wyoming

To Camp Dodge, Iowa, base hospital, for instruction, Lieut. E. E. DALE, Lusk.

To Camp Meade, Md., Lieut. W. S. PUNCHEON, Rock Springs.

ORDERS TO OFFICERS OF THE MEDICAL CORPS, U. S. ARMY

Alabama

To Army Medical School for instruction, Lieut. P. P. SALTER, Montgomery.

To Camp Alfred Vail, N. J., from Nashville, Capt. J. W. FENN, Eufaula.

To Camp Beauregard, La., base hospital, from Camp Shelby, Lieut. R. P. BURKE, Montgomery.

To Camp Crane, Pa., from Camp Devens, Lieut. C. D. GASTON, Birmingham; from Camp Travis, Lieut. D. H. SPARKS, Ensley.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. C. W. HILLIARD, Dothan.

Alaska

The following order has been revoked: *To Army Medical School* for instruction from Fort William H. Seward, Capt. H. M. CRAIG, Haines.

Arizona

To Camp Crane, Pa., from Camp Sherman, Major C. T. STURGEON, Globe.

Arkansas

To Camp Dix, N. J., from Fort Riley, Lieut. A. E. TATMAN, Eureka Springs.

To Hot Springs, N. C., from Fort Sam Houston, Capt. J. S. JENKINS, Pine Bluff.

California

To Camp Fremont, Calif., base hospital, Capt. C. D. Baker, Los Angeles. Base hospital, for instruction, Capt. R. PATEK, San Francisco.

To Camp Grant, Ill., from Long Island City, Major M. A. WILLIAMSON, Long Pine.

To Camp Meade, Md., from Fort Oglethorpe, Lieut. C. C. DICKINSON, McCloud.

To Camp Pike, Ark., base hospital, Lieut. A. H. CURRIE, Los Angeles.

To Camp Sherman, Ohio, base hospital, from Camp Lewis, Lieut. E. H. McMILLAN, Pasadena.

To Fort Oglethorpe for instruction, Capt. A. F. HAMMAN, Long Beach; Lieuts. R. L. CRUM, Los Angeles; R. K. BARRY, Sunnyvale.

To Fort Riley for instruction, from San Francisco, Capt. C. B. HARE, San Jose.

To Fort Sheridan, Ill., base hospital, from Camp Kearney, Lieut. C. A. BRIGGS, Sacramento; from Camp Lewis, Capt. A. A. ATKINSON, Dorris.

To Fort Snelling, Minn., base hospital, from Camp Kearney, Capts. H. A. FISKE, Pasadena; P. M. Savage, San Bernardino; J. WEHRLY, Santa Ana; from Camp Lewis, Capt. M. L. LOOMIS, Los Angeles; from San Francisco, Capts. F. K. COLLINS, Los Angeles; R. A. Whiffen, San Jose; Lieut. L. R. JOHNSON, Stockton.

Honorably discharged, Major A. C. MAGEE, San Diego, Capt. G. M. DUNNE, San Francisco.

Canal Zone

To New Haven, Conn., Yale Army Laboratory School, from Army Medical School, Lieut. J. W. SHERRILL, Ancon.

Colorado

To Camp Crane, Pa., from Camp Cody, Capt. E. G. GRIFFIN, Denver; from Camp Lewis, Capt. A. W. METCALF, Jr., Henderson.

To Camp Gordon, Ga., Capt. C. H. FISCHER, Walden.

To Camp Travis, Texas, Lieut. C. ENOS, Denver.

To Camp Zachary Taylor, Ky., from Army Medical School, Lieut. W. D. FLEMING, Denver.

To Denver, Colo., Capt. J. F. WALLACE, Woodmen. As examiner, from Plattsburg Barracks, Major F. H. McNAUGHT, Denver.

Connecticut

To Camp Custer, Mich., to examine the command for nervous and mental diseases, from Fort Des Moines, Capt. J. F. FAULKNER, New Britain.

To Camp Greene, N. C., base hospital, from Fort Oglethorpe, Major J. M. SLEMONS, New Haven.

To Camp Sevier, S. C., to examine the command for nervous and mental diseases, from Camp Jackson, Lieut. C. F. VERNLUND, Hartford.

To Fort Benjamin Harrison, from Hoboken, Capt. A. B. COLEBURN, Middletown. Base hospital, from Camp Custer, Major H. M. LEE, New London.

Delaware

To Camp Crane, Pa., from Lakewood, Lieut. A. K. LOTZ, Wilmington.

To Camp Jackson, S. C., base hospital, from Camp Joseph E. Johnston, Lieut. J. R. ELLIOTT, Laurel.

To Fort Oglethorpe for instruction, Lieut. H. H. DODD, Millsboro.

District of Columbia

To Boston, Mass., from the Surgeon-General's Office, Col. J. T. CLARKE.

To Camp Cody, N. M., as division surgeon, from Washington, Lieut.-Col. J. J. REDDY.

To Camp Crane, Pa., from Camp Dix, Lieut. D. W. PRENTISS, Washington.

To Camp Devens, Mass., from Army Medical School, Lieut. I. C. RIGGIN, Washington.

To Camp Gordon, Ga., from Army Medical School, Lieut. J. B. WHITE, Washington.

To Camp Sherman, Ohio, from Army Medical School, Lieut. M. C. SOSMAN, Washington. As division surgeon, from Washington, Lieut.-Col. W. T. CADE, Jr.

To Camp Wadsworth, S. C., as division surgeon, from Washington, Lieut.-Col. J. F. JOHNSTON.

To New Haven, Conn., Yale Army Laboratory School, from Army Medical School, Lieut. A. L. GUERRA, Washington.

Florida

To Camp Beauregard, La., base hospital, from Camp Shelby, Capt. F. J. BOWEN, Jacksonville.

To Camp Crane, Pa., from New Haven, Capt. H. O. BYRD, Trilby.

To Camp Gordon, Ga., from Army Medical School, Lieut. C. W. HENDERSON, Tampa.

To Camp Greene, N. C., base hospital, from Camp Wheeler, Major J. A. LIVINGSTON, Jacksonville.

To Camp Sherman, Ohio, from Fort Oglethorpe, Major M. B. SWIFT, Orlando.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. R. R. NIBLACK, New Smyrna.

Georgia

To Camp Beauregard, La., base hospital, from Camp Jackson, Lieut. J. S. STEWART, Athens; from Camp Sevier, Lieut. J. E. MORRISON, Savannah; from Fort Oglethorpe, Lieut. H. L. SUMMERLIN, Meigs.

To Camp Crane, Pa., from Camp Wheeler, Major C. C. HARROLD, Macon.

To Camp Custer, Mich., Lieut. J. O. KINARD, Atlanta.
To Camp Jackson, S. C., base hospital, from Camp McClellan, Lieut. W. M. FOLKS, Waycross.
To Camp Joseph E. Johnston, Fla., Lieut. R. N. BURCH, Milltown.
To Camp McClellan, Ala., evacuation hospital, from Fort Sam Houston, Lieut. S. P. WISE, Plaine.
To Fort Oglethorpe for instruction, Lieut. L. T. WATERS, Egypt.
To Hoboken, N. J., from Camp Mills, Major C. C. HARROLD, Macon.
To Hot Springs, N. C., from Camp Greene, Lieut. M. BLANCHARD, Columbus.
To Madison Barracks, N. Y., from Fort Oglethorpe, Lieut.-Col. C. W. HAVERKAMPF.
Honorably discharged, Lieut. P. J. PENISTON, Newman.

Hawaii

To Camp Zachary Taylor, Ky., from Army Medical School, Lieut. G. C. MILNOR, Honolulu.

Idaho

To Camp Grant, Ill., base hospital, Lieut. W. L. LINDSAY, Neuman.
To Camp Kearney, Calif., base hospital, from Camp Lewis, Capt. E. G. BRADDOCK, Lewiston.

Illinois

To Army Medical School for instruction, Lieuts. H. C. CAROTHERS, J. STEVENSON, Chicago.
To Camp A. A. Humphreys, Va., as orthopedic surgeon, from Fort Oglethorpe, and on completion *to Boston, Mass.*, Harvard Graduate School of Medicine, for instruction, Lieut. A. M. WASHBURN, Chicago.
To Camp Abraham Eustis, Va., camp hospital, from Millington, Tenn., Lieut. L. L. TURNER, Chicago.
To Camp Beauregard, La., base hospital, from Camp Logan, Capt. J. F. STRAUSS, Chicago; from Camp Pike, Capt. C. W. COMPTON, Springfield; from Camp Shelby, Capt. C. R. LOCKWOOD, Kankakee; from Camp Sheridan, Capt. B. J. LACHNER, Rock Island; from Camp Wadsworth, Lieut. B. J. SCHWARTZ, Waukegan; from Fort Oglethorpe, Capt. D. C. PHILLIPS, Lieut. B. J. MUSSELWHITE, Chicago; from Hot Springs, Ark., Capt. G. A. DARMER, Aurora.
To Camp Crane, Pa., Lieut. C. E. SMELTZER, Aledo; from Army Medical School, Lieut. L. R. KRATZE, Chicago; from Camp Custer, Lieut. J. T. MEYER, Chicago; from Camp Lee, Capt. C. H. ZOLLER, Litchfield; from Camp Wadsworth, Capt. F. C. SIBLEY, Carmi; Lieut. C. F. HARRIS, Chicago; from Camp Wheeler, Capt. A. E. GAMMAGE, Chicago.
To Camp Greene, N. C., Lieut. R. A. VOIGHT, Chicago. Base hospital, from Camp Wadsworth, Capt. E. M. RUNDQUIST, Rockford. *To examine the troops* for cardiovascular diseases, from Lakewood, Lieut. A. SUMMERS, Oak Forest.
To Camp Hancock, Ga., base hospital, from Camp McClellan, Lieut. A. J. WEIRICK, Marseilles.
To Camp Joseph E. Johnston, Fla., from Fort Oglethorpe, Lieut. W. E. CLAY, Mount Carroll.
To Camp Kearney, Calif., from Fort Oglethorpe, Capt. J. M. BLUM, Chicago.
To Camp Lee, Va., to examine the command for nervous and mental diseases, from Camp Zachary Taylor, Lieut. E. C. PRATT, Kankakee.
To Camp Meade, Md., from Washington, Lieut. M. J. RABBINS, Chicago.
To Camp Sevier, S. C., base hospital, from Camp Logan, Capt. C. H. PARKES, Chicago; from Camp Travis, Lieut. W. K. REED, Chicago; from Fort Oglethorpe, Lieut. R. GRIFFY, Oblong.
To Camp Sherman, Ohio, from Columbus, Lieut. F. M. McNAIR, Sugar Grove. Base hospital, from Fort Oglethorpe, Capt. C. L. PATTON, Springfield.
To Camp Travis, Texas, from Fort Riley, Capts. C. S. DAVIS, Champaign; G. F. JOHNSON, East Moline.
To Camp Zachary Taylor, Ky., base hospital, Lieut. J. S. EISENSTAEDT, Chicago; from Fort Oglethorpe, Lieut. H. F. MOORE, Rockford.
To Denver, Colo., from Walter Reed General Hospital, Capt. S. M. SALA, Rock Island.
To Edgewood, Md., base hospital, from Camp Meade, Capt. O. A. R. DONNELLY, Lieut. E. J. DEVINE, Chicago.
To Fort Benjamin Harrison, base hospital, from Camp Dodge, Lieut. E. A. CORCORAN, Chicago.
To Fort Des Moines, Iowa, from Walter Reed General Hospital, Major J. L. PORTER, Chicago.
To Fort McHenry, Md., from New York, Capt. P. P. HAZLITT, Marshall. For instruction, Capt. J. B. MOORE, Zeigler.
To Penniman, Va., from Army Medical School, Lieut. H. L. LE SAULNIER, Red Bud.
To Rockefeller Institute, Lieut. S. A. SMITH, Chillicothe.
To Washington, D. C., from Camp Lee, Major S. V. BALDERSTON, Evanston.
Honorably discharged on account of physical disability existing prior to entrance into the service, Capts. C. F. BURKHARDT, Effingham; C. P. COLBY, Springfield; B. F. HOCKMAN, Sumner; Lieuts. C. C. Montgomery, Lincoln; W. F. JUSTUS, Littleton.
The following order has been revoked: *To Fort Snelling, Minn.*, base hospital, from Camp Grant, Lieut. A. S. SANDLER, Chicago.

Indiana

To Camp Beauregard, La., base hospital, from Camp Travis, Lieut. G. M. COOK, Mooresville; from Fort Oglethorpe, Capt. W. R. DAVIDSON, Evansville.
To Camp Logan, Texas, from Fort Riley, Capt. M. F. HUNN, Shipshowana.
To Camp Sevier, S. C., as tuberculosis examiners, from Camp Jackson, Lieut. C. F. VOIGT, New Albany; from New Haven, Lieut. J. M. GORDON, South Bend.
To Camp Sherman, Ohio, base hospital, from Camp Custer, Lieut. C. A. SELLERS, Hartford City.
To Camp Travis, Texas, from Fort Riley, Lieut. F. H. RILEY, Linnsburg.
To Camp Upton, N. Y., as orthopedic surgeon, from Jefferson Barracks, Capt. W. C. MOSS, Bunker Hill.
To Camp Zachary Taylor, Ky., from Terre Haute, Lieut. J. L. FORTUNE, Terre Haute. Base hospital, Capt. F. S. CROCKETT, LaFayette; from Camp Custer, Lieut. P. S. JOHNSON, Sheridan; from Fort Benjamin Harrison, Lieut. T. L. SULLIVAN, Indianapolis.
To Carlisle, Pa., from Baltimore, Capt. J. H. NILES, Seymour.
To Fort Bayard, N. M., from Camp Newton D. Baker, Lieut. B. R. KIRKLIN, Muncie.
To Fort Benjamin Harrison, Lieut. J. E. McCABE, Buck Creek.
To Fort Oglethorpe, base hospital, from Camp Dodge, Lieut. E. N. BENNETT, Kokomo. Evacuation hospital, from Camp Sherman, Lieut. C. C. PITLER, New Castle.
To Hot Springs, N. C., from Camp Bowie, Lieut. F. KLEINMAN, Hebron.
To San Diego, Calif., Rockwell Field, from Mineola, Lieut. K. M. KOONS, Indianapolis.
To Washington, D. C., from Fort Benjamin Harrison, Capt. F. M. WHISTLER, Wabash.
Honorably discharged, Lieut. C. S. ALBERTSON, Walton. On account of physical disability existing prior to entrance into the service, Lieuts. J. KENTLING, Bloomington; A. J. BAUER, LaFayette.

Iowa

To Camp Crane, Pa., from Camp Green, Capt. P. E. SAWYER, Sioux City.
To Camp Custer, Mich., from Fort Oglethorpe, Lieut. L. T. REED, Gravity.
To Camp Devens, Mass., base hospital, from Camp Dodge, Capt. M. A. HEALY, Boone; Lieut. J. G. CLAPSADDLE, Burt.
To Camp Dodge, Iowa, base hospital, for instruction, Lieut. C. A. MANAHAN, Marengo.
To Fort Benjamin Harrison, Lieut. P. V. KETCHUM, Des Moines. Base hospital, from Camp Grant, Capt. A. D. McKINLEY, Lieut. H. E. RANSOM, Des Moines.
To Fort Oglethorpe, base hospital, from Camp Dodge, Lieut. A. C. DAVIS, Iowa City. For instruction, from Camp Bowie, Lieut. B. S. BARNES, Shenandoah.
To Fort Snelling, Minn., base hospital, from Camp Dodge, Lieut. M. O. BRUSH, Shenandoah.
To Hot Springs, N. C., from Wichita Falls, Texas, Lieut. C. KAIL, Stratford.
To Plattsburg Barracks, N. Y., from Fort Oglethorpe, Major C. VAN EPPS, Iowa City.
Honorably discharged, Lieut. F. H. GAFFEY, Bradgate.

Kansas

To Camp Beauregard, La., base hospital, from Camp Pike, Capt. L. S. COPLAN, Wellington.
To Camp Crane, Pa., from Fort Riley, Capt. F. J. WALKER, Wichita.
To Camp Custer, Mich., to examine the command for nervous and mental diseases, from Fort Des Moines, Capt. C. E. ROSS, Wichita.
To Camp Devens, Mass., from Fort Riley, Capt. L. S. WAGAR, Florence. Base hospital, from Camp Dodge, Lieut. H. A. ALEXANDER, Topeka.
To Camp Dodge, Iowa, base hospital, Capt. F. A. ECKDALL, Emporia.
To Camp Greene, N. C., base hospital, from Camp Gordon, Lieut. E. D. PODDA, Arma.
To Camp Sherman, Ohio, base hospital, from Fort Oglethorpe, Lieut. M. F. RUSSELL, Great Bend.
To Rock Island, Ill., Capt. W. D. HUNT, Emporia.
Honorably discharged, Lieut. J. L. WORK, Topeka. On account of physical disability existing prior to entrance into the service, Lieut. O. J. DIXON, Mound Valley.

Kentucky

To Camp Crane, Pa., from New Haven, Lieut. G. S. BRZOZOWSKI, Louisville.
To Camp Custer, Mich., base hospital, from Camp Zachary Taylor, Capt. C. WILSON, Greenville.
To Camp Gordon, Ga., base hospital, for instruction, Lieut. A. H. SHOMWELL, Paducah.
To Camp Greene, N. C., base hospital, from Camp Sheridan, Capt. W. H. SMITH, Danville; Lieut. W. I. HUME, Louisville.
To Camp Jackson, S. C., base hospital, from Camp Sevier, Lieut. W. T. BRUNER, Louisville.
To Camp Zachary Taylor, Ky., Lieut. G. F. JONES, Henderson.
To Fort Oglethorpe for instruction, Capt. H. J. McKENNA, Louisville.
To Washington, D. C., from Louisville, Lieut.-Col. J. P. FLETCHER.
Honorably discharged, Lieut. L. E. GILBERT, Marion. On account of physical disability existing prior to entrance into the service, Capts. J. F. BRYANT, Corbin; D. J. WILLIAMS, Richmond; Lieuts. G. W. BOOHER, Berry; K. B. WOOLERY, Falmouth; J. R. COTTELL, Louisville; J. A. KIRK, Philpot.

Louisiana

To Camp Beauregard, La., base hospital, from Camp Pike, Lieut. H. D. VAN SCHAICK, Elizabeth.
To Camp McClellan, Ala., with the board examining the command for tuberculosis, from Camp Joseph E. Johnston, Lieut. B. R. HENINGER, New Orleans.
To Camp Sevier, S. C., to examine the command for nervous and mental diseases, from Camp Jackson, Lieut. P. Y. DONALD, Jackson.
To Camp Sherman, Ohio, evacuation hospital, from Camp Beauregard, Lieut. C. H. SHARP, New Orleans.
Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. A. R. TRAHAN, Lafayette.

Maine

To Camp Crane, Pa., from Camp Devens, Lieut. J. E. POULIN, Augusta.
To Fort Oglethorpe, base hospital, from Camp Zachary Taylor, Capt. H. J. EVERETT, Portland.
To Newport News, Va., from Fort Oglethorpe, Lieut. W. J. LEWIS, Freeport.

Maryland

To Camp Crane, Pa., from Camp Lee, Lieut. B. M. JAFFE, Baltimore; from Fort Oglethorpe, Lieut. H. L. ROGERS, Baltimore.
To Camp Custer, Mich., from Army Medical School, Lieut. H. G JOHNSON, Baltimore.
To Camp Gordon, Ga., from Army Medical School, Lieut. G. H. PRESTON, Baltimore.

To Camp Grant, Ill., from Army Medical School, Lieut. C. M. REDDIG, Baltimore.

To Camp Jackson, S. C., from Army Medical School, Lieut. S. O. REESE, Jr., Baltimore. As orthopedic surgeon, and on completion *to Boston, Mass.*, Harvard Graduate School of Medicine, for instruction, from Fort Oglethorpe, Lieut. L. BRADY, Baltimore.

To Camp Meade, Md., base hospital, for instruction, Lieut. S. H. STREET, Baltimore.

To Camp Sevier, S. C., base hospital, from Camp Jackson, Lieut. J. T. NELSON, Baltimore.

To Camp Sherman, Ohio, base hospital, from Camp Sheridan, Capt. G. M. LINTHICUM, Baltimore.

To Fort Oglethorpe, evacuation hospital, from Camp Joseph E. Johnston, Capt. M. LEVY, Baltimore.

To Newport News, Va., Lieut. R. ROSEN, Baltimore.

To Walter Reed General Hospital, D. C., from Fort Oglethorpe, Lieuts. W. T. ANDERSON, L. BRADY, Baltimore.

To Washington, D. C., for consultation, from Hoboken, N. J., Capt. R. FAYERWEATHER, Baltimore.

Massachusetts

To Boston, Mass., Parker Hill, from the Surgeon-General's Office, Major P. BROWN, Boston; from Walter Reed General Hospital, Major F. J. COTTON, Boston.

To Camp Crane, Pa., from Camp Devens, Major E. L. DAVIS, Springfield; Capt. E. J. HUSSEY, Holyoke; Lieuts. G. A. BUCKLEY, Brockton; J. J. PAGLIA, Worcester; from Rockefeller Institute, Lieut. A. B. LYON, Boston; from Walter Reed General Hospital, Lieuts. G. W. BLOOD, Fall River.

To Camp Custer, Mich., base hospital, Major W. E. FAULKNER, Boston.

To Camp Devens, Mass., base hospital, for instruction, Lieut. P. D. BLANCHARD, Lowell.

To Camp Gordon, Ga., as camp psychiatrist, from Camp Upton, Major G. E. McPHERSON, Harding.

To Camp Greene, N. C., base hospital, from Camp Wadsworth, Lieuts. J. J. DONOVAN, Boston; C. T. COBB, Northampton; C. A. SCHILLANDER, Springfield.

To Camp Hancock, Ga., base hospital, from Walter Reed General Hospital, Major E. B. BIGELOW, Worcester.

To Camp Jackson, S. C., as orthopedic surgeon, and on completion *to Boston, Mass.*, Harvard Graduate School of Medicine, for instruction, from Camp Jackson, Lieut. D. F. MURPHY, Beverly.

To Camp Meade, Md., from Fort Oglethorpe, Lieut. D. S. KING, Brookline.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. J. B. THOMES, Pittsfield.

Michigan

To Camp Gordon, Ga., base hospital, from Camp McClellan, Capt. W. T. PARKER, Corunna.

To Camp Greene, N. C., base hospital, from Camp Gordon, Capt. O. L. RICKER, Cadillac.

To Camp Shelby, Miss., evacuation hospital, from Fort Oglethorpe, Lieut. D. L. PULFORD, Detroit.

To Camp Sherman, Ohio, evacuation hospital, from Camp Zachary Taylor, Capt. H. MacMULLEN, Manistee.

To Camp Zachary Taylor, Ky., as orthopedic surgeon, and on completion *to Boston, Mass.*, Harvard Graduate School of Medicine, for instruction, from Fort Oglethorpe, Lieut. E. J. LYNCH, Detroit. Base hospital, from Camp Sevier, Capt. A. W. McDONALD, Detroit. Base hospital, for instruction, Capt. J. N. BELL, Detroit.

To Fort Oglethorpe for instruction, Capt. C. F. SMITH, Whitehall.

To Fort Riley for instruction, Lieut. D. C. SMITH, Flushing.

To Hoboken, N. J., from Fort Oglethorpe, Lieut. P. R. URMSTON, Bay City.

To Hot Springs, N. C., from Camp Lee, Lieut. C. R. MUELLER, Detroit.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. H. L. CHARLES, Calumet.

Minnesota

To Camp Crane, Pa., from Fort Oglethorpe, Lieut. G. T. NORDIN, Minneapolis.

To Camp Custer, Mich., base hospital; from Camp Grant, Lieut. D. D. TURNACLIFF, St. Paul; from Camp Sherman, Lieut. H. J. A. J. HARTIG, Minneapolis.

To Camp Dodge, Iowa, base hospital from Camp Sherman, Lieut. F. N. KNAPP, St. Paul.

To Camp Grant, Ill., from Army Medical School, Lieut. C. F. SNELL, Twin Valley.

To Camp Meade, Md., from Camp Lee, Major J. C. SESSIONS, Minneapolis. Evacuation hospital, from Camp MacArthur, Lieut. F. W. WHITMORE, St. Paul.

To Fort Riley for instruction, Lieut. F. V. SANGENDORFER, St. Paul.

To Fort Sheridan, Ill., base hospital, from Camp Zachary Taylor, Capt. M. J. LYNCH, Minneapolis.

To report to the comanding general, Southern Department, from Fort Bayard, Lieut. V. H. MOATS, Minneapolis.

Honorably discharged, on account of physical disability existing prior to entrance into the service, Capt. J. A. McLAUGHLIN, Minneapolis.

Mississippi

To Camp Crane, Pa., from Camp Lewis, Lieut. L. B. NEAL, Jackson, from Jefferson Barracks, Lieut. F. H. RUSSELL, Wayside.

To Camp Jackson, S. C., base hospital, from Camp Sheridan, Lieut. T. G. CLEVELAND, Meridian.

To Camp Zachary Taylor, Ky., base hospital, from Fort McPherson, Lieut. M. C. ARMSTRONG, Arm.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. W. E. MOODY, Lake, Lieuts. M. E. BRIDGES, Bobo; W. C. NORRIS, Quitman.

Missouri

To Camp Beauregard, La., base hospital, from Camp Pike, Capt. J. W. MacDONALD, St. Louis; from Camp Shelby, Capt. N. SAENGER, Lieut. G. C. LYTTLE, St. Louis.

To Camp Cody, N. M., as assistant to division surgeon, from Camp Beauregard, Lieut. L. M. SPALDING, Olean. Base hospital, from Camp Travis, Capt. A. R. TIMERMAN, St. Joseph.

To Camp Crane, Pa., from Camp Dix, Capt. W. U. KENNEDY, St. Louis; from Camp Hancock, Lieut. F. F. HAAS, St. Louis; from Camp Lewis, Lieut. W. C. KLEIN, Kansas City; from Camp Zachary Taylor, Capt. J. M. DEAN, Lieut. P. McGENNIS, St. Louis.

To Camp Custer, Mich., as sanitary inspector, from Camp Pike, Capt. T. R. AYARS, St. Louis. Base hospital, from Camp Grant, Lieut. L. O. MUENCH, St. Paul. Base hospital, for instruction, Major J. H. OUTLAND, Kansas City.

To Camp Devens, Mass., from Fort Riley, Lieut. A. R. STONE, Palmyra.

To Camp Logan, Texas, Lieut. F. H. HARNAGEL, St. Louis.

To Camp Pike, Ark., base hospital, for instruction, Lieut. A. J. CAMPBELL, Sedalia.

To Camp Sevier, S. C., base hospital, from Camp Logan, Lieut. L. S. JAMES, Blackburn.

To Camp Sheridan, Ala., from Fort Oglethorpe, Lieut. J. T. MALONE, St. Louis.

To Camp Zachary Taylor, Ky., base hospital, from Camp Morrison, Lieut. J. C. PEDEN, St. Louis.

To Dansville, N. Y., from Camp McClellan, Capt. W. T. PATTERSON, Hannibal.

To Fort Oglethorpe, base hospital, from Camp Dodge, Lieut. J. L. SWARTZ, St. Louis.

To Fort Sheridan, Ill., base hospital, from Camp Grant, Capt. E. T. SENSENEY, St. Louis; from Cape May, Capt. J. R. VAUGHAN, St. Louis.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. E. H. BRADLEY, Springfield; Lieut. W. B. INMAN, St. Louis.

Montana

To Camp Gordon, Ga., base hospital, from Camp Shelby, Capt. R. L. OWENS, Hamilton.

To Camp Travis, Texas, from Fort Riley, Lieut. J. E. STUART, Livingston.

To Fort Benjamin Harrison, Capt. P. H. McCARTHY, Butte.

To Fort Riley for instruction, Lieut. P. S. RENNICK, Stevensville.

To Fort Sheridan, Ill., base hospital, from Camp Grant, Lieut. J. W. OLSON, Troy; from Camp Kearney, Major R. HORSKY, Helena.

Nebraska

To Camp Crane, Pa., from Camp Custer, Lieut. O. E. COLEMAN, Ainsworth.

To Camp Custer, Mich., base hospital, from Western Department, Capt. C. H. CAMPBELL, Columbus.

To Camp Jackson, S. C., base hospital, from Camp Joseph E. Johnston, Lieut. J. W. DUNCAN, Omaha.

To Camp Sherman, Ohio, base hospital, from Cape May, Major E. C. HENRY, Omaha.

To Camp Travis, Texas, from Fort Riley, Capt. H. L. STARKEY, Wood River.

To Fort Leavenworth, Kan., Lieut. H. H. JOHNSON Winnebago.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. E. R. PORTER, Omaha.

Nevada

To Camp A. A. Humphreys, Va., base hospital, from Camp Lee, Capt. J. P. CRAWFORD, Mina.

To Fort Oglethorpe for instruction, from Fort Sam Houston, Lieut. J. T. REES, McDermitt.

New Hampshire

To Camp Beauregard, La., base hospital, from Fort McPherson, Capt. J. B. WOODMAN, Franklin.

To Camp Crane, Pa., from Camp Devens, Capt. J. E. TOYE, Charleston.

To Fort Oglethorpe, evacuation hospital, from Camp Travis, Lieut. G. A. JOHNSON, Concord.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. C. E. JOHNSTONE, Portsmouth.

New Jersey

To Army Medical School for instruction, from Walter Reed General Hospital, Lieut. C. F. VOORHIS, Palmyra.

To Camp Crane, Pa., from Camp Lee, Lieut. J. L. FARDEN, Irvington.

To Camp Dix, N. J., from Army Medical School, Lieut. T. W. CONNOLLY, Jersey City.

To Camp Gordon, Ga., base hospital, Lieut. C. P. CLARK, Summit.

To Camp Greene, N. C., as orthopedic surgeon, and on completion *to Boston, Mass.*, Harvard Graduate School of Medicine, for instruction, from Fort Oglethorpe, Lieut. W. G. McCORMACK, Whippany.

To Camp Jackson, S. C., Lieut. M. B. WEINSTOCK, Newark.

To Camp Meade, Md., from Army Medical School, Lieut. J. J. MANN, Perth Amboy.

To Fort McHenry, Md., for instruction, Capt. J. L. FEWSMITH, Newark.

To Fort Porter, N. J., Lieut. R. STEWART, Secausus.

To Hot Springs, N. C., from Edgewood, Lieut. J. J. MacDONALD, Jersey City; from Fort Ontario, Capt. E. B. ROGERS, Collingswood.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. H. DAY, Chester; Lieuts. C. C. FERGUSON, Jersey City; T. L. CALDRONEY, North Hackensack.

New Mexico

To Whipple Barracks, Ariz., from Camp Cody, Capt. T. E. PRESLEY, Roswell.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. N. D. FRAZIN, Tyrone.

New York

To Army Medical School for instruction, Lieut. F. A. KNOPE, Rochester; from Camp Crane, Capt. G. M. PARKHURST, Bath; from Camp Raritan, Lieut. T. M. CALLADINE, Perry.

To Camp Beauregard, La., base hospital, from Camp Jackson, Lieut. W. C. MILLER, New York; from Fort Oglethorpe, Lieuts. M. L. HILLSMAN, Little Valley; W. W. OLIVER, New York.

To Camp Crane, Pa., from Army Medical School, Lieut. M. L. BRANDT, New York; from Camp Devens, Capt. R. A. EDSON, Buffalo; Lieuts. A. W. BECK, Brooklyn; E. A. CLARKE, Buffalo; from Camp Dix, Capt. H. S. CAMPBELL, Otto; Lieuts. J. P. HEN-

NESSY, Jr., New York; F. S. SCHOONOVER, Rochester; from Camp Greene, Capt. G. W. CONTERNO, New York; from Camp Jackson, Lieut.-Col. W. A. LAWRENCE, White Plains; from Camp Lee, Lieut. J. L. PRESTON, New York; from Camp Meade, Lieuts. J. L. EVERLOF, C. V. O'BRIEN, Brooklyn; from Camp Sheridan, Lieut. B. WILSON, New York; from Camp Zachary Taylor, Lieut. R. G. CARLIN, New York; from Fort Des Moines, Major T. WRIGHT, Buffalo; Capt. J. TENOPYR, Brooklyn; from Fort McPherson, Lieut. A. A. BERSIN, Brooklyn; from Fort Oglethorpe, Lieut. J. GOLDSTONE, New York; from New Haven, Lieut. A. SCHULTZ, Brooklyn; from Walter Reed General Hospital, Lieut. C. G. STEINHAUSER, Rochester; from Williamsbridge, Major L. G. COLE, New York.

To Camp Custer, Mich., from Army Medical School, Lieut. R. M. DEGRAFF, Buffalo. Base hospital, from Camp Sherman, Capts. J. R. HERRICK, Hempstead; D. S. CONLEY, New York.

To Camp Lee, Va., from Fort Oglethorpe, Major T. DARLINGTON, New York.

To Camp McClellan, Ala., base hospital, from Camp Beauregard, Lieut. H. W. KEMP, Brooklyn. *To examine the troops for cardiovascular diseases*, from Lakewood, Lieut. A. TOWBIN, Flushing.

To Camp Meade, Md., Lieut. R. MALCOLM, Yonkers; from Army Medical School, Lieuts. R. BOGAN, Brooklyn; H. T. COMPTON, New York.

To Camp Sevier, S. C., base hospital, from New Haven, Capt. W. A. GROAT, Syracuse.

To Camp Sheridan, Ala., as orthopedic surgeon, from Camp Wheeler, Lieut. L. FASKE, Brooklyn.

To Camp Upton, N. Y., Capt. F. OVERTON, Patchogue; from Army Medical School, Lieuts. F. DAMRAU, W. V. MOORE, Brooklyn; W. S. BENNETT, Glen Falls; C. G. IRISH, E. A. LANE, New York.

To Camp Wadsworth, S. C., as sanitary inspector, from Camp MacArthur, Major T. W. MALONEY, Geneva.

To Camp Zachary Taylor, Ky., base hospital, from Camp McClellan, Capt. F. M. O'GORMAN, Buffalo; from Fort McPherson, Lieut. S. E. APPEL, Dover Plains.

To Fort Benjamin Harrison, base hospital, from Camp Cody, Lieut. I. M. LEAVY, New York.

To Fort Hancock, N. J., from New York, Capt. J. R. FARRELL, New York.

To Fort Meyer, Va., from Hampton, Va., Major A. G. COUMBE, Mineola.

To Fort Oglethorpe for instruction, Lieuts. C. E. CURTISS, Manlius; L. A. GERACI, F. W. RICE, New York.

To Fort Porter, N. Y., from Fort Oglethorpe, Lieut. A. B. FERGUSON, New York.

To Fort Sheridan, Ill., base hospital, from Camp Devens, Lieut. W. H. HAWKINS, New York.

To Hoboken, N. J., from Camp Gordon, Lieut. T. W. NEUMANN, Poughkeepsie; from Camp Upton, Lieut. M. A. RAMIREZ, New York. Base hospital, from Camp A. A. Humphreys, Capt. I. HOLLEY, Brooklyn.

To Walter Reed General Hospital, D. C., for instruction in amputation and artificial limbs, from the Surgeon-General's Office, Capt. C. E. E. PANNACI, Gloversville.

To Washington, D. C., for consultation, and on completion *to Camp Lee, Va.*, as orthopedic surgeon, from Fort Riley, Major C. D. NAPIER, Brooklyn. On completion *to Camp Shelby, Miss.*, from Syracuse, Capt. M. A. ROTHSCHILD, New York. For instruction, from New York, Capt. H. W. HAYNES, New York. St. Elizabeth's hospital, for instruction, from Plattsburg Barracks, Lieut. M. E. COSTELLO, Branchport.

To Williamsbridge, N. Y., Lieut. M. D. GOLDFEIN, Brooklyn.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. O. C. J. VON RENNER, Buffalo.

The following orders have been revoked: *To Army Medical School*, from Rockefeller Institute, Lieut. W. C. STADIE, New York. *To Fort Snelling, Minn.*, base hospital, Lieut. M. SONKIN, New York.

North Carolina

To Azalea, N. C., from New Haven, Capt. T. P. CHEESBOROUGH, Asheville.

To Camp Lee, Va., from Army Medical School, Lieuts. J. W. CLARKSON, Hickory; J. H. BULLOCK, Oxford.

To Camp Sherman, Ohio, base hospital, from Fort Oglethorpe, Capt. F. J. PATE, Greensboro.

To Fort Oglethorpe, as instructor in internal medicine, from Camp Custer, Major T. FRAZER, Asheville.

To Washington, D. C., for consultation, and on completion *to Camp Crane, Pa.*, from Camp Greene, Lieut.-Col. H. M. SNYDER.

North Dakota

To Camp Grant, Ill., base hospital, for instruction, Lieut. A. J. KAESS, Fargo.

Ohio

To Camp Abraham Eustis, Va., camp hospital, Lieut. S. WOLF, Cincinnati.

To Camp Cody, N. M., from Fort Oglethorpe, Capt. W. M. BLAINE, Youngstown.

To Camp Crane, Pa., from Camp Custer, Lieut. C. T. BAHLER, Walnut Creek; from Camp Dix, Capt. C. D. HOY, Columbus; from Camp Jackson, Lieut. M. S. GRIFFITH, Batavia; from Fort McHenry, Major N. M. JONES, Cleveland; from Fort Oglethorpe, Capt. A. E. IBERSHOFF, Cleveland; from New Haven, Lieuts. R. H. MARKWITH, Columbus; V. B. HALBERT, Sylvania.

To Camp Joseph E. Johnston, Fla., from Fort Oglethorpe, Lieut. C. A. LINGENFELTER, Bucyrus.

To Camp McClellan, Ala., Lieut. R. A. THORNTON, Columbus.

To Camp Pike, Ark., base hospital, Lieut. A. H. CARR, Reading.

To Camp Shelby, Miss., base hospital, Capt. D. C. HOUSER, Urbana. Base hospital, for instruction, Lieut. C. V. DAVIS, Cleveland. Evacuation hospital, from Fort Sam Houston, Lieut. R. E. LIGHTNER, Kingston.

To Camp Sheridan, Ala., base hospital, Capt. H. M. TARR, Cleveland Heights Village.

To Jefferson Barracks, Mo., from Fort Riley, Lieut. G. H. REEVE, Cleveland.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieuts. J. L. TODD, Canton; J. T. BOYKIN, Cleveland; E. E. SHEFFIELD, Elyria; I. P. SEILER, Piketon; W. A. ORT, Springfield.

Oklahoma

To Camp Crane, Pa., from Camp Hancock, Lieut. R. L. WESTOVER, Okmulgee; from Camp MacArthur, Lieut. C. N. BERRY, Norman; from Fort Riley, Lieut. C. A. BRAKE, Oklahoma City.

To Camp Gordon, Ga., base hospital, from Fort Riley, Capt. E. L. BAGBY, Fairfax.

To Camp Greene, N. C., base hospital, from Fort Oglethorpe, Lieut. H. BLENDER, Okeene.

To Camp Sevier, S. C., base hospital, from Camp Joseph E. Johnston, Capt. B. LOVELADY, Guthrie; Lieut. V. C. TISDAL, Elk City.

To Camp Sherman, Ohio, base hospital, from Camp Bowie, Lieuts. C. E. CALHOUN, Sand Springs; C. E. DAVIS, Woodward; from Fort Des Moines, Lieut. R. L. PENDERGRAFT, Hollis.

To Camp Travis, Texas, Lieut. W. H. AARON, Pawhuska.

To Camp Zachary Taylor, Ky., base hospital, from Camp Sevier, Lieut. L. M. SACKETT, Oklahoma City.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. J. G. THOMAS, Alluwe.

Oregon

To Camp Devens, Mass., from Fort Riley, Capt. V. R. ABRAHAM, Hood River.

To Camp Gordon, Ga., as orthopedic surgeon, and on completion *to Boston, Mass.*, Harvard Graduate School of Medicine, for instruction, from Fort Oglethorpe, Lieut. R. E. WATKINS, Portland.

To Philadelphia, Pa., Jefferson Medical College, for instruction, from Camp Abraham Eustis, Lieut. A. O. WALLER, Eugene.

Pennsylvania

To Camp Beauregard, La., base hospital, from Fort Oglethorpe, Capt. J. W. SCHOFFSTALL, Sunbury.

To Camp Crane, Pa., from Army Medical School, Lieut. J. M. FLEMING, Blairs Mills; from Camp Custer, Lieut. C. B. LAMP, Seminole; from Camp Devens, Capt. J. TURNER, Philadelphia; from Camp Dix, Major P. H. MOORE, Philadelphia; Capt. S. W. MILLER, Lancaster; Lieuts. I. H. SHELLY, Ambler; L. C. RUMMAGE, Sweet Valley; from Camp Dodge, Capt. J. WARD, Lucernemines; from Camp Lee, Lieuts. E. M. HUGHES, Butler; V. P. VIESLET, Charleroi; A. E. S. CASEY, Philadelphia; from Camp Pike, Lieut. G. B. SCHOONMAKER, Philadelphia; from Camp Sevier, Lieut. A. E. COLCHER, Philadelphia; from Camp Sherman, Lieut. G. GINSBURG, Philadelphia; from Fort Oglethorpe, Lieut. J. E. MAGEE, Carnegie; from New Haven, Lieut. H. W. KINDERMAN, Philadelphia.

To Camp Dix, N. J., from Army Medical School, Lieuts. W. C. McCONNELL, Norberth; G. A. BROWN, J. B. HAINES, E. W. KEMNER, Philadelphia; L. H. FITZGERALD, Pittsburgh; from Walter Reed General Hospital, Lieut. S. B. PEARCE, Pittsburgh.

To Camp Dodge, Iowa, base hospital, Capt. C. E. McKEE, Pittsburgh.

To Camp Greene, N. C., evacuation hospital, from Southern Department, Lieut. D. M. AIKMAN, Brockwayville.

To Camp Jackson, S. C., from Army Medical School, Lieut. P. S. SEABOLD, Philadelphia.

To Camp Las Casas, P. R., camp hospital, Major C. H. SMITH, Uniontown.

To Camp Meade, Md., from Army Medical School, Lieut. G. M. UNDERWOOD, Philadelphia.

To Camp Sevier, S. C., base hospital, from Camp Joseph E. Johnston, Lieut. G. S. HENSYL, Mahoney City; T. B. HERRON, Monessen.

To Camp Wadsworth, S. C., Lieut. R. H. LUKE, North Erie.

To Denver, Colo., from New Haven, Capt. J. C. FOLTZ, Philadelphia; N. D. MacARTAN, Cresson.

To Detroit, Mich., from Cleveland, Capt. A. B. SHATTO, York.

To Fort Benjamin Harrison, base hospital, from Lakewood, Lieut. C. W. ESPY, Wilkes-Barre.

To Fort Oglethorpe, evacuation hospital, from Ann Arbor, Lieut. J. P. BOYLE, Philadelphia. For instruction, Lieut. J. M. KEICHLINE, Petersburg.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. A. K. WANNER, Reading; Lieut. D. M. KOONTZ, New Kensington.

The following order has been revoked: *To Walter Reed General Hospital, D. C.*, from Fort Oglethorpe, Lieut. W. C. REESE, Wilkes-Barre.

Philippine Islands

To San Francisco, Calif., from Philadelphia Department, Major A. C. MILLER.

South Carolina

To Camp Crane, Pa., from Camp Devens, Lieut. F. L. MARTINE, Mullins; from Camp Dix, Lieut. A. E. BROWN, Greenville; from Walter Reed General Hospital, Lieut. J. K. WICKER, Newberry.

To Camp Wadsworth, S. C., from Panama Canal Department, Capt. T. J. PEAKE, Clinton.

The following order has been revoked: *To New Haven, Conn.*, Yale Army Laboratory School, for instruction, from Columbia, S. C., Lieut. J. A. HAYNES, Columbia.

South Dakota

To Camp Beauregard, La., base hospital, from Camp Pike, Capt. B. A. BOBB, Mitchell.

To Camp Crane, Pa., from Camp Dodge, Lieut. R. REAGAN, Garretson.

To Fort Benjamin Harrison, base hospital, from Camp Grant, Lieuts. G. E. VAN DEMARK, Sioux Falls; V. R. HODGES, Terry.

To Fort Warren, Mass., from Fort Oglethorpe, Lieut. B. C. MURDY, Aberdeen.

Tennessee

To Camp Cody, N. M., as tuberculosis examiner, from Fort Bayard, Capt. F. B. BREWER, Nashville

To Camp Dodge, Iowa, base hospital, from Biltmore, N. C., Capt. O. B. CHANDLER, Union City.

To Camp Shelby, Miss., base hospital, Lieut. H. K. ALEXANDER, Nashville.

To Fort Oglethorpe, evacuation hospital, from Ann Arbor, Lieut. P. J. TRENTZSCH, Rives. For instruction, Major R. M. KIRBY-SMITH, Sewanee.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. B. E. NOBLITT, Fayetteville.

Texas

To Camp Beauregard, La., base hospital, Lieut. E. L. MAXWELL, Delhart; from Camp Logan, Capt. E. F. McMANUS, San Antonio. Base hospital, for instruction, Capt. H. M. LANHAM, Waco.

To Camp Crane, Pa., from Camp Bowie, Lieut. T. C. GILBERT, Dallas; from Camp Custer, Major S. F. Terrell, Dallas; from Fort Oglethorpe, Lieut. E. V. HENRY, Coleman.

To Camp Gordon, Ga., base hospital, from Camp Shelby, Major J. G. FLYNN, Galveston; Lieut. F. W. FRANCIS, Fort Worth.

To Camp Greene, N. C., from Dayton, Capt. D. L. SANDERS, Wills Point. Base hospital, from Southern Department, Lieut. L. J. LOGUE, Houston.

To Camp Hancock, Ga., evacuation hospital, from Fort Sam Houston, Capt. G. W. WILHITE, Calsetine.

To Hot Springs, N. C., from Camp Bowie, Lieut. A. R. AUTREY, Port Authur.

To New Haven, Conn., Yale Army Laboratory School, from Army Medical School, Lieut. O. T. KIRKSEY, Galveston.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capt. L. P. ALLISON, Brownwood; Lieut. W. L. BABER, Winnsboro.

The following order has been revoked: *To Camp Joseph E. Johnston, Fla.*, base hospital, Lieut. A. S. GRAYDON, Paris.

Utah

To Camp Crane, Pa., from Camp Cody, Capt. P. INGEBRETSEN, Ogden; from Camp Fremont, Capt. F. M. McHUGH, Salt Lake City; from New Haven, Lieut. B. A. DENNENBERG, Heber.

To Camp Dodge, Iowa, base hospital, from Camp Cody, Lieut. W. N. PUGH, Salt Lake City.

To Camp Wheeler, Ga., evacuation hospital, from Camp Cody, Capt. H. P. KIRTLEY, Salt Lake City.

Vermont

To Camp Crane, Pa., from New Haven, Capt. H. L. CRAHAN, Rutland.

To Camp Gordon, Ga., base hospital, from Fort Oglethorpe, Capt. E. G. TWITCHELL, Burlington.

To Camp Upton, N. Y., base hospital, from Hoboken, Major C. D. WILKINS, Brattleboro.

To Camp Wheeler, Ga., base hospital, Lieut. L. M. KELLY, Manchester Center.

To Fort McHenry, Md., from Walter Reed General Hospital, Capt. W. J. TINDALL, Montpelier.

To New Haven, Conn., Yale Army Laboratory School, for instruction, from Rockefeller Institute, Lieut. A. L. FOGG, Underhill.

Honorably discharged on account of physical disability existing prior to entrance into the service, Capts. N. R. CALDWELL, Groton; S. S. MARTIN, Windsor.

Virginia

To Camp Crane, Pa., from Fort Oglethorpe, Lieut. W. S. TUCKER, New Glasgow; from New Haven, Lieut. C. B. COURTNEY, Fairfax.

To Fort Oglethorpe, base hospital, from Newport News, Capt. T. C. FIREBAUGH, Harrisburg.

To report to the commanding general, Philippine Department, from Fort Ontario, Major J. W. HOPE, Hampton.

To Syracuse, N. Y., from Fort Meyer, Major A. G. COOMBE.

Honorably discharged on account of physial disability existing prior to entrance into the service, Lieuts. H. S. SCOTT, Emory; L. B. STATON, Norfolk.

Washington

To Camp Crane, Pa., from Camp Cody, Capt. G. A. GRAY, Spokane.

To Camp Zachary Taylor, Ky., base hospital, from Camp Custer, Lieut. J. S. DAVIES, Tacoma.

To Fort Oglethorpe, evacuation hospital, from Camp Lewis, Lieut. J. HEHIR, Sedro-Wooley.

To Fort Sheridan, Ill., base hospital, from Camp Custer, Lieut. W. H. BOONE, North Yakima.

To Fort Snelling, Minn., base hospital, from Camp Lewis, Lieut. W. F. CUNNINGHAM, Seattle.

The following order has been revoked: *To Camp Kearney, Calif.*, Lieut. C. S. PASCOE, Tacoma.

West Virginia

To Camp Bowie, Texas, base hospital, from Camp Gordon, Capt. C. DENHAM, Weston.

To Camp Crane, Pa., from Fort McPherson, Lieut. B. B. COX, Morgantown.

To Camp Custer, Mich., base hospital, for instruction, Major J. E. CANNADAY, Charleston.

To Camp McClellan, Ala., evacuation hospital, from Fort Sam Houston, Lieut. T. E. VASS, Bluefield.

To Camp Meade, Md., Capt. C. P. SHIRKEY, St. Albans.

To Camp Sevier, S. C., base hospital, Lieut. W. T. OWENS, Clarksburg.

To Fort Oglethorpe for instruction, Capt. G. A. MacQUEEN, Charleston.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. A. E. BAYS, Barboursville.

Wisconsin

To Army Medical School for instruction, from Rantoul, Ill., Lieut. D. L. DAWSON, Rice Lake.

To Camp Abraham Eustis, Va., camp hospital, and on completion *to Boston, Mass.*, Harvard Graduate School of Medicine, for instruction, from Fort Oglethorpe, Capt. J. W. POWERS, Burlington.

To Camp Custer, Mich., from Fort Oglethorpe, Lieut. S. J. SEEGER, Milwaukee. Base hospital, from Camp Sherman, Capt. F. E. ANDRE, Kenosha. Base hospital, for instruction, Lieuts. R. E. FLYNN, La Crosse; H. McCABE, Milwaukee.

To Camp Gordon, Ga., base hospital, from Camp Gordon, Lieut. J. W. HANSEN, Milwaukee.

To Camp Grant, Ill., from Army Medical School, Lieut. C. A. CIBELIUS, Racine.

To Camp Jackson, S. C., base hospital, Capt. S. G. PAKE, Hayward.

To Camp Sherman, Ohio, as sanitary inspector, from Camp Zachary Taylor, Major W. W. PRETTS, Platteville. *To examine the command* for nervous and mental diseases, from Camp Grant, Capt. J. F. VENN, Milwaukee.

To Camp Travis, Texas, from Fort Riley, Capt. F. W. McKEE, Richland Center; Lieut. S. C. McCORKLE, Wallis.

To Fort Benjamin Harrison, base hospital, from Camp Custer, Lieut. V. STARNES, Mauston; from Camp Grant, Lieut. J. B. VEDDER, Marshfield.

To Fort Riley for instruction, Capt. A. J. GATES, Tigerton; Lieut. H. J. GRAMLING, Milwaukee.

Honorably discharged on account of physical disability existing prior to entrance into the service, Lieut. G. F. KENNEY, Milwaukee.

Wyoming

To Fort Benjamin Harrison, base hospital, from Camp Custer, Capt. C. E. HARRIS, Basin; from Fort Riley, Capt. G. A. FOX, Cheyenne.

To New Haven, Conn., from Fort Riley, Capt. M. A. NEWELL, Sheridan.

ORDERS TO OFFICERS OF THE UNITED STATES PUBLIC HEALTH SERVICE

Surg. JOHN McMULLEN, proceed to Nitro, W. Va., for conference relative to treatment of applicants for employment suffering from trachoma.

Surg. G. W. McCOY, represent the service at the meetings of the Laboratory Section of the American Public Health Association at Chicago.

P. A. Surg. F. A. CARMELIA, relieved at Newport News, Va. Proceed to bureau for duty.

P. A. Surg. E. W. SCOTT, relieved at Washington, D. C. Proceed to Rosebank, Staten Island, N. Y., for duty.

P. A. Surg. JOSEPH BOLTEN, relieved at the Hygienic Laboratory. Proceed to the San Francisco Quarantine Station for duty.

P. A. Surg. W. L. TREADWAY, proceed to Nitro, W. Va., and advise regarding installation and operation school medical inspection system.

P. A. Surg. J. G. TOWNSEND, proceed to Ranger and Petrolia, Texas, to supervise sanitary work.

Asst. Surg. W. F. FOX, visit Houston, Texas, to study venereal disease control methods.

Prof. C. W. STILES, proceed to Wilmington, N. C., for duty.

Prof. E. B. PHELPS, proceed to places in the vicinity of Washington to investigate public need of a contemplated improvement.

Pharm. C. H. BIERMAN, proceed to Boston Quarantine Station for temporary duty.

A. A. Surg. O. D. ADAMSON, relieved at Columbia, S. C. Proceed to Fayetteville, N. C., for duty.

A. A. Surg. J. B. ELLIOTT, relieved at Florence, Ala. Proceed to Little Rock, Ark., for duty.

A. A. Surg. ROBERT E. GRAMLING, proceed to Leavenworth, Kan., for duty in venereal control.

A. A. Surg. W. F. REASNER, proceed to Hattiesburg, Miss., for duty.

A. A. Surg. I. P. ROBINSON, relieved at Leavenworth, Kan. Proceed to Washington, D. C.

A. A. Surg. GEORGE W. SHIRK, proceed to Houston, Texas, for duty in venereal disease control.

San. Eng. H. W. STREETER, proceed to Cincinnati and Lima, Ohio, to investigate public health value of contemplated improvements.

Asst. San. Eng. H. F. S. TAIT, proceed to Shreveport, La., to investigate public health value of contemplated improvement.

Asst. Epid. C. C. APPLEWHITE, relieved at Englewood, N. J. Proceed to Atlanta, Ga., for duty.

Scien. Asst. SAMUEL SAUNDERS, Jr., assume charge of health activities in Brunswick and Glenn County, Ga.

Asst. Director DAVID ROBINSON, proceed to Philadelphia and confer with the State Counsel of National Defense concerning venereal control measures.

Surg. J. GOLDBERGER, directed to proceed to New England and other states to undertake studies in regard to the etiology of influenza with special reference to its transmission.

Surg. L. P. H. BAHRENBERG, deliver an address at the Missouri Baptist state convention at Fulton, Mo., Oct. 22, 1918.

P. A. Surg. H. J. WARNER, relieved at Atlanta, Ga., proceed to Ellis Island, N. Y.

P. A. Surg. W. F. DRAPER, proceed to Boston, Mass., to assume charge of Service operations in connection with control of epidemic diseases.

P. A. Surg. G. A. KEMPF, proceed to Boston, Mass., for duty in the suppression of influenza.

P. A. Surg. J. H. LINSON, proceed to Boston, Mass., for duty in the suppression of influenza.

Asst. Surg. H. C. YARBROUGH, proceed to the Reedy Island Quarantine Station for temporary duty.

Asst. Surg. T. B. H. ANDERSON, proceed to Wichita and other points in the state of Kansas for duty in inaugurating venereal disease clinics.

Asst. Surg. C. R. ESKEY, relieved at Montgomery, Ala., proceed to Boston, Mass., for duty in the suppression of influenza.

Asst. Surg. CHARLES ARMSTRONG, proceed to Boston, Mass., for duty in the suppression of influenza.

Asst. Surg. R. E. DYER, proceed to Boston, Mass., for duty in the suppression of influenza.

Asst. Surg. J. K. FULLER, proceed to Boston, Mass., for duty in the suppression of influenza.

Asst. Surg. R. P. SANDIDGE, relieved at Louisville, Ky., proceed to Boston, Mass., for duty in the suppression of influenza.

A. A. Surg. D. A. BUCK, relieved at Baltimore, Md., proceed to Norfolk, Va., for duty.

A. A. Surg. W. C. EDMUNDS, proceed to Boston, Mass., for duty in the suppression of influenza.

A. A. Surg. F. F. FARNSWORTH, attend the meeting of the American Public Health Association at Chicago, Ill., Oct. 14-17, 1918.

A. A. Surg. ARTHUR R. PILLSBURY, proceed to Boston, Mass., for duty in connection with venereal disease control measures.

A. A. Surg. STAFFORD B. SMITH, proceed to New York City for duty in venereal disease control measures.

A. A. Surg. ABRAHAM TRUMPER, relieved at San Antonio, Texas, proceed to Montgomery, Ala., for duty in extracantonment sanitation.

A. A. Surg. W. A. WILSON, proceed to various places in the state of New York for duty in connection with venereal disease control.

Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST; SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION, PUBLIC HEALTH, ETC.)

ARKANSAS

Medical Society Meeting Deferred.—After a consultation with the executive officers of the Third District Medical Society, it was decided to defer the annual meeting until next year because of the disturbed conditions in the profession. The meeting was to have been held at Lonoke.

Quarantined on Account of Influenza.—The town of Carlisle was quarantined, September 24, on the order of Dr. Jacob C. Geiger of the United States Public Health Service, on account of influenza, of which there were 125 cases on that date. The epidemic was traced to two sailors who had come to Carlisle on furlough from Boston. Lieut. A. M. Jones of the medical service was placed in charge of the situation by Dr. Geiger.

CALIFORNIA

Personal.—Dr. J. Perry Lewis, San Diego, who has been seriously ill is reported to be convalescent.——E. H. Meyers, Napa, is reported to have been found guilty of violating the Harrison Narcotic Law, and is said to have been ordered to pay a fine of $200 or as an alternative to be imprisoned for fifty days in the county jail.

GEORGIA

Personal.—Dr. Jarrett W. Palmer, Ailey, has been appointed a member of the state board of medical examiners for a term of four years, from September 1.

Hospital Annex Opened.—The annex to the Savannah Marine Hospital, located in the former home of Dr. William Duncan, East Oglethorpe, was opened, September 16, with accommodation for twenty-four patients.

Sanatorium Sold.—The Williams Private Sanatorium, Macon, founded by the late Dr. Howard J. Williams, formerly president of the state board of health, has been sold to Drs. Max Jackson, Olin H. Weaver, Thomas D. Walker, Jr., and Charles H. Richardson, Jr. The sanatorium will be operated under its original name.

ILLINOIS

Practicing Without a License.—Six midwives who were practicing in Joliet without a license were arrested and each of them fined $100 and costs, recently, by the Department of Registration and Education of the State of Illinois.

Infantile Paralysis.—During July and August 125 cases of infantile paralysis were reported to the state department of health from thirty counties in Illinois. Of these cases forty-seven were reported from Cook, thirteen from Kankakee and ten from Jo Daviess County.

Mandamus Petition Denied.—A report from the Department of Registration and Education of Illinois states that Judge Hebel has declined to grant the petition of the Chicago Hospital College of Medicine for mandamus against the department to compel restoration of good standing.

Personal.—Dr. H. Eugene Delavergne, Belvidere, secretary of the Boone County Medical Society, is about to move to Kankakee. The Boone County Medical Society at a meeting, September 25, presented Dr. Delavergne with a mahogany office chair.——Dr. Robert C. Mitchell, Belvidere, has been elected secretary of the Boone County Medical Society.——Dr. Philip F. Gillette, Elgin, has returned to his old position as assistant physician to the Elgin State Hospital.——Dr. Frazier N. Cloyd, Danville, has been appointed surgeon for the New York Central Lines, to succeed Dr. George L. Williamson, Danville.

Chicago

Medical College Not Suspended.—The statement published, October 5, saying that the Hahnemann Medical College and Hospital of Chicago has suspended for the duration of the war and which appeared to be based on good authority has proved to be incorrect. The college has recently received authority from the government to establish a unit in the Students' Army Training Corps.

Personal.—Dr. Henry F. Lewis resigned, September 30, as professor and head of the department of obstetrics and gynecology in the School of Medicine of Loyola University.——Dr. John E. Macklin has been commissioned captain, C. A. M. C., and has been assigned to temporary duty at the Willows Camp, Victoria, B. C.——Lieut.-Col. Ernest E. Irons, M. C., U. S. Army, on duty at Camp Custer, Mich., is reported to be ill with influenza.——Major Edmund J. Doering, M. C., U. S. Army, president of the local board of examiners for the Medical Corps of the Army, has been promoted to the rank of lieutenant-colonel.——Dr. Adolphe R. Caron has been operated on in the Passavant Hospital. He expects to enter Red Cross service in France.——Dr. H. I. Davis has been commissioned for service with the American Red Cross in France.

Illegal Practitioners Arrested.—The following violators of the Medical Practice Act, all residing in Chicago, were arrested by the Department of Registration and Education of the State of Illinois, and fined the amounts stated:

David Reeder, 5039 Cottage Grove Avenue, $25 and costs. Mr. Reeder informed the court that he was leaving Illinois for Indiana, his home state.

M. Szyrepkowski, 1610 N. LaSalle St., $25 and costs.

Roman Trumalski 1600 N. LaSalle St., $25 and costs.

Stan Kierzek, 4758 Justine St., case dismissed on payment of costs amounting to $8.50.

Madion M. Ormsby, 20 S. Clark St., turned over to the probation court and an officer appointed to look after him. Ormsby is 76 years old and very feeble.

Michael Crawczyk, $25 and costs on a charge of violating the medical practice act by treating Charles Zuraj without a license.

MARYLAND

Personal.—Dr. Alma Rothholz, who has distinguished herself as a war worker in France, has been requested by Queen Elizabeth of Belgium to take charge of a hospital near the front for the babies of Belgium. The mission of the institution is to provide medical attention for all the babies of that stricken country.

State Hospital Train in Public Health Service.—Following a request from Surgeon-General Blue, made through the Public Health Service, the Maryland State Hospital Train was sent in less than eleven hours after the call was received to Fall River, Mass., to combat the spread of the influenza. This is the first time the train has been put into service since its equipment. The train was ready very soon after the request was received, but its departure was held up by the fact that physicians and nurses, now very scarce, could not be secured on time. Ten nurses, six from the Union Protestant Infirmary and four from the University Hospital, responded to the call and the following physicians were secured: Drs. Edgar M. Parlett, Baltimore, Calvin N. Gabriel, John W. Abbott and Thomas C. Worthington. Dr. Daniel Z. Dunott, chief surgeon of the Western Maryland Railroad, is in charge of the train.

MINNESOTA

Health Merger Bill.—At a meeting in the office of Hennepin County Medical Society, Minneapolis, September 18, the consolidation of all public health organizations under a single head was discussed. A bill providing for this consolidation will go before the state legislature this fall. The mayor and five members of the city council will be members of the board.

Personal.—Dr. Gustav A. Renz, assistant city health officer of St. Paul, who has been ill at St. Joseph's Hospital, has recovered and assumed practice.——Dr. John Sundwall, Lawrence, Kan., has been appointed health commissioner of the University of Minnesota.——A medical military unit is being formed at Rochester with Dr. Frederick L. Smith as captain and Dr. Willis S. Lemon as first lieutenant.

Course in Public Health Nursing.—The University School for Nurses at the request of the Minnesota Public Health Association, according to the weekly journal of that association for September 26, has determined to provide a four months' intensive course in public health nursing for graduates and to accredited schools of nursing for the benefit of their senior students. It has been the aim of the university school to establish a regular course in this work, but the exigencies of the war have delayed this action.

Tuberculosis Clinics.—A rural clinic was held at Fertile, September 25, by Dr. Charles H. Cole, medical director of Sunny Rest Sanatorium, Crookston, under the auspices of the advisory commission of the State Sanatorium for Consumptives. At this clinic twenty-two persons presented themselves for examination and twelve of these cases were referred to the sanatorium. Regular clinics are held every Tuesday

at the Sunny Rest Sanatorium and every Thursday at Oakland Park Sanatorium, Thief River Falls, of which Dr. Cole is also medical director. At these clinics from four to eight persons come for examination each week.——A tuberculosis clinic in Renville County was held at the County Court House, Olivia, September 30, from 11 a. m. to 1 p. m., and from 3 p. m. to 6 p. m., under the charge of Dr. Abraham P. Terk of Riverside Sanatorium, Granite Falls.——A free tuberculosis clinic was conducted at the office of the health department of Eveleth, September 12, by Dr. Arthur T. Laird of Nopeming Sanatorium.——The antituberculosis committee of the Minneapolis Associated Charities at its annual meeting, September 20, voted to expend $18,000 during the coming year toward the assistance of the Red Cross in caring for returned soldiers suffering from tuberculosis; for the establishment of a Childrens' Preventorium to be located at Glen Lake; for tuberculosis dispensaries to be located in settlement houses; for two physicians to be added to the force in charge of tuberculosis clinics, and for the salary of a nurse to be added to the nurse force of the tuberculosis division of the city health department.

MONTANA

Hospital Cornerstone Laid.—The cornerstone of the new St. Vincent's Hospital, Billings, was laid with appropriate ceremonies, September 29. The building will cost about $400,000.

The Handling of Venereal Diseases.—At a meeting of the state board of health two new divisions were created for the handling of venereal diseases under the government plan. One division will have charge of the enforcement of rules and regulations, and the other will handle the publicity and education.

Personal.—Dr. John M. Scanland, superintendent of the State Hospital for the Insane, Warm Springs, has been commissioned captain, M. C., U. S. Army.——Dr. A. P. Stevenson, Roundup, has been appointed health officer of Musselshell County, to succeed Dr. George A. Lewis, who has resigned to enter the military service.——Dr. Oscar M. Lanstrum, Helena, has won the republican nomination for United States Senator from Montana.

NEBRASKA

Social Morality.—Dr. Abby Virginia Holmes, Omaha, is disposing of her practice and will devote her entire time to lectures on social morality and sex education in colleges and universities and also in communities adjacent to training camps.

Personal.—Dr. Albert P. Fitzsimmons, formerly of Tecumseh, but now treasurer of the Philippine Islands, is paying a visit to his old home.——Dr. Edward A. Hudson, Edison, is seriously ill as the result of a cerebral hemorrhage.——Dr. George M. White, Ingleside, has been appointed assistant superintendent of the Ingleside State Hospital.——Dr. Wilford H. Crutcher, superintendent of the State Orthopedic Hospital, Lincoln, has resigned to enter the military service.——Dr. Dellizon A. Foote, Omaha, was operated on at Rochester, Minn., September 18, and is reported to be doing well.——Dr. Charles W. Ervin, Lincoln, has been appointed assistant adjutant-general of the state.——Dr. Beverly A. Finkle, assistant superintendent of the Norfolk State Hospital, has been appointed superintendent of the State Orthopedic Hospital, Lincoln.——Dr. Lawrence B. Pilsbury, superintendent of the Lincoln State Hospital, has resigned to enter the military service.

NEW JERSEY

Centennial of Medical Society.—The Gloucester County Medical Society celebrated its one hundredth anniversary at Winona, September 19. The twenty-nine members of the organization were all present, together with invited guests.

Influenza at Gloucester City.—According to the board of health records of Gloucester City there were, October 4, 3,000 cases of influenza, of which 300 had developed pneumonia. The situation in the shipyards was a serious one, 600 workers being ill. Dr. D. C. Bowen of the state board of health made a survey and telephoned to the National Red Cross headquarters at Washington for six trained nurses. Three additional physicians were secured and another hospital, in the auditorium of the city hall, was opened. At Pusey and Jones (shipyards) twenty-five patients were in the temporary hospital.

Personal.—Dr. Irwin W. Kirk has been elected city physician of Millville to succeed Dr. Charles H. Mayhew, who has resigned to enter the military service.——Dr. Norman S. Garrison, Rutherford, has been elected medical inspector for the Deerfield and Lawrence township schools.——Dr. W. S. Jones, Trenton, has resigned as a member of the State Board of Charities and Correction to become commandant of the Soldiers' and Sailors' Home at Vineland.——Under the adjustment made by the state board of health, Dr. Henry A. Cotton has withdrawn his resignation as medical director of the Trenton State Hospital and will resume his duties with an increase in salary from $4,500 to $6,000 a year.

NEW YORK

The Home Touch for Medical Officers.—The Onondaga County Medical Society has issued a monthly publication known as *The Bulletin*, which will contain news items of interest to medical officers from that part of the state on duty with the American Expeditionary Forces, and so will keep them in touch with local events of interest.

Personal.—Dr. Frank Vander Bogart, Schenectady, has been appointed medical supervisor of child welfare work with the American Red Cross in Italy.——Dr. Franklin C. Gram, acting health commissioner of Buffalo, has been commissioned captain, M. C., N. Y. State Guard, and has been assigned to duty with the 65th Infantry.——Major William G. Bissell, Buffalo, M. C., N. Y. State Guard, assigned to duty with the 65th Infantry, has been selected as professor of military hygiene and sanitation in the student course to be given under the auspices of the War Department at Canisius College.

New York City

Personal.—Dr. Elbert M. Somers, Brooklyn, has entered the service of the American Red Cross as hospital superintendent in France.

Harvey Society Lecture.—The first lecture of the Harvey Society course will be given, October 19, at 8:30 p. m., by Dr. Edward K. Dunham, on "Certain Aspects of the Application of Antiseptics in Military Practice."

OHIO

Physician Fined.—Dr. Julius P. Haynes, a colored practitioner of Toledo charged with illegally furnishing habit-forming drugs, is reported to have pleaded guilty in the probate court, and to have been fined $100 and costs.

Personal.—Dr. Henry C. Eyman, because of age and failing health, has resigned as superintendent of the Massillon State Hospital after thirty-four years' continuous service in state hospitals, and has been succeeded by Dr. Arthur G. Hayde, who has been for several years superintendent of the Cleveland State Hospital.——Dr. Charles E. Sawyer, Marion, chairman of the War Savings Campaign, has been presented by the Ohio War Savings Committee with a gold medal for distinguished service.——Dr. Francis A. McCullough, Mansfield, who was operated on at the Protestant Hospital, recently, is reported to be convalescent.

Miscellaneous Health Activities.—An inspector of the state department of health reports that at Canton there are five times as many cases of tuberculosis as are being cared for or receiving attention from public health nurses. There are also many cases of trachoma in the city.——The state department has joined the United States Public Health Service in recommending that smallpox vaccination and antityphoid inoculation be required of all employees in industrial plants, on the ground that the protection of the health of employees making war munitions is just as important as that of the soldiers in the field.——The department has adopted the plan of checking disease reports against death reports to obtain evidence against physicians who fail to report communicable diseases. In this manner eleven unreported cases of typhoid fever were discovered in June. Local health departments are urged to follow a like plan with reference to reports of communicable diseases.

Recent Gifts Toward Western Reserve University Medical Group.—Two years ago a plot of land which approximated 15 acres in extent, known as the Ford Estate, was purchased as a site for the new buildings of the Medical Department of Western Reserve University and for a new Lakeside Hospital, for a babies' and for a maternity hospital. It was the plan to create a group of hospital buildings combined with the medical school to make an ideal teaching plant for the teaching of medicine. This tract is situated next to the literary departments of Western Reserve University and the Case School of Applied Science. Although the war has postponed the erection of any of these buildings, Lakeside Hos-

pital lately received some noteworthy contributions and bequests which will materially hasten the buildings. By the will of the late Col. Oliver Payne a large and generous gift of $1,000,000 came to Lakeside to be used at the discretion of the trustees. By the will of the late Mr. W. S. Tyler, Cleveland, a trustee of Lakeside, a bequest of $200,000 was provided to be applied toward the erection and endowment of a maternity ward on the new site. Mr. Samuel Mather, president of Lakeside, opened the new building fund of the hospital by a gift of $350,000. There is also a fund held by the trustees of Lakeside for the benefit of the children's and maternity wards amounting to something over $150,000.

PENNSYLVANIA

Tuberculosis Dispensaries Close.—Dr. B. Franklin Royer, Harrisburg, acting state commissioner of health, has ordered all the 120 tuberculosis dispensaries of the department of health closed so that the nurses may be used in the general epidemic work. This is the first time in the history of the department that it has been necessary to take such a step.

Epidemic Increasing.—October 4, at Harrisburg three deaths and 1,000 cases of influenza were announced by the local board of health. Six hundred cases had been reported during the previous twenty-four hours. Churches and schools were closed.——Bethlehem reported 125 new cases within the twenty-four hours ending October 4.——No cases were reported at Lebanon, but the city was closed as a preventive measure.——In Pittsburgh, moving picture and other theaters and all public meeting places, were closed. October 4, all Liberty Loan and other public meetings were prohibited. The universities, where the students of the Army Training Corps are located, were placed under guard to insure strict quarantine.

Personal.—Dr. Samuel G. Foster, Franklin, was taken ill while performing an operation, September 18, but is now reported to be improving.——Dr. William F. Doyle, Pottsville, is ill at his home with pneumonia.——Dr. Granville H. Walker, Bellevue, who has been seriously ill at his home, is reported to be improved.——Dr. Charles M. Rickert, Millersburg, has been appointed assistant chief medical inspector for the state department of health, to succeed Dr. John J. Mullowney.——Dr. Charles J. Swalm has been elected medical inspector by the Conshohocken School Board.——Dr. Mariam E. K. Frisbie, South Williamsport, has been appointed medical supervisor of the State Hospital, Somerset, to succeed Dr. John S. Marian, who has resigned to enter the military service.

Philadelphia

Campaign for Roosevelt Hospital.—The members of the staff of the Roosevelt Hospital and their friends, September 24, began a campaign to raise $300,000, the amount needed to erect a larger, modern and fully equipped hospital in the district served by the hospital for the last fifteen years.

Beds for Sailors Endowed.—Thirty-five beds for sailors have been endowed at St. Francis Country House at Darby, which has been selected by the government as a convalescent home for men in the service. Many of these beds, the endowment of which is $100, have been given in the name of some American, who has given his life for this country.

Sails for France.—Dr. Caroline M. Purnell has sailed for France as a member of the second unit, American Women's Hospital. Dr. Purnell is also special commissioner in the American Women's Hospital in France, and her mission is to inspect the medical hospitals, and consult with the French authorities and American Red Cross, and survey the field generally.

Personal.—Dr. John A. Kolmer, who has been conducting an investigation of influenza at his laboratory in the Philadelphia Hospital, has been stricken with the disease and is confined to his home.——The following municipal appointments have been announced: Dr. T. Ruth Hartley, special inspector, board of health; Drs. Katherine Radley, Rose Harrison and Samuel Friedenburg, school medical inspectors.

Influenza Epidemic Increasing.—Within the twenty-four hours, ending at noon, October 5, 1,480 new cases had been reported with 159 deaths directly due to the influenza. In the week ending at noon, October 4, there were reported in the city 1,191 deaths from all causes. Of this number 399 were directly chargeable to influenza, 330 being adults and 69 minors. Pneumonia was the cause of the death of 229 persons, of whom 45 were minors and 184 adults; while bronchopneumonia was responsible for the death of 79 persons of whom 44 were adults and 35 minors.——By order of the board of health all schools and churches have been closed, public gatherings prohibited and the sale of liquor stopped throughout the city. Hotels, restaurants, cafes and all political clubs have been ordered to close their bars by the department of health, and retail drug stores have been permitted to sell spirituous and malt liquors only on presentation of a doctor's prescription.

VERMONT

State Society Meeting Postponed.—By order of the state board of health the program for the annual meeting of the Vermont State Medical Society, which was to have been held October 10 and 11, has been postponed.

CANADA

Canadian Medical Protective Association.—The report of the annual transactions of this body has recently been mailed to all members. The report of counsel stated that the association had been called on during the past year to assist some ten members in defending suits for alleged malpractice; in three, action has not been proceeded with; in another the plaintiff withdrew his case, and in still another the plaintiff withdrew and admitted that the conduct of his medical man had been satisfactory. No case of a serious charge against a member occurred.

Medical Society News.—The Academy of Medicine, Toronto, opened for the season, October 1, when Col. Alexander Primrose, C.B., delivered the presidential address.——The Aesculapian Club, Toronto, held its first regular meeting, Thursday evening, October 10, under the presidency of Dr. Harry B. Anderson. The Rev. Canon Gould, M.D., thirteen years a medical missionary in Palestine and Arabia, gave an address on "Palestine and Arabian Factors in the Allied Cause."——At the first open meeting of the Peterborough (Ont.) Medical Society, the evening of October 3, Drs. Richard A. Reeve and Harry B. Anderson, Toronto, were present and delivered addresses.

Blind in Canada.—There are said to be about 700 blind persons in Canada; two-thirds of these lost their sight after reaching 21 years of age. There are five schools for the blind in the dominion with more than 306 pupils. At the present time there are about eighty blinded soldiers. Recently the Canadian National Institute has been incorporated for the purpose of helping the blind. The ways they will be helped are in industrial training, with workshops and other necessary offices. It is believed that $100,000 will be required for the first year's work and $70,000 for the second. Among the blind members of this institute are Dr. Charles R. Dickson, the eminent Canadian electrotherapeutist, and Dr. Thomas Milroy, Winnipeg, Man.

GENERAL

Railway Surgeons to Meet.—The twenty-eighth annual meeting of the New York and New England Association of Railway Surgeons will be held at Hotel McAlpin, New York City, October 21, under the presidency of Dr. James S. Hill, Bellows Falls, Vt.

Dies After Long Service.—Sergt. First Class, David Robertson, Medical Department, U. S. Army, 85 years of age, who had served for sixty-four consecutive years on Governors Island, N. Y., died at his quarters, August 13, from cancer of the intestine and right kidney.

Appropriation for Combating Influenza.—Both the House and Senate have passed House Joint Resolution 333 appropriating $1,000,000 to be expended by the Public Health Service in combating influenza in the present epidemic and other communicable diseases. The money will be available until June 1, 1919, and the work is to be done in conjunction with the medical services of the Army and Navy.

Bequests and Donations.—The following bequests and donations have recently been announced:

Toronto General Hospital, $2,000 for the endowment of a bed; Hospital for Sick Children, $2,000 for the endowment of a bed, contributed by Miss W. J. Barr, Toronto.

Hahnemann Hospital and Philadelphia Home for Incurables, each $5,000 by the will of Mrs. Mary Stotesbury Crozier.

Burlington County Hospital, Mount Holly, N. J., $500, and Friends' Asylum, Frankfort, a sum for the erection of a memorial cottage, by the will of Margaret H. Jones.

Physicians of Southwest to Meet.—At the annual meeting of the Medical Association of the Southwest to be held in Dallas, October 15 to 17, under the presidency of Dr. Edward H. Martin, Hot Springs, Ark., a special war program will be presented. Lieut.-Col. Harry Mock of the Surgeon-General's Office will speak on "The Reconstruction Work as Planned

by the Government." The American Red Cross, the Public Health Service, the Pure Food Department and the Council of National Defense will also be represented at the meeting.

Tuberculosis Conference.—The North Atlantic Tuberculosis Conference, representing the states of New York, New Jersey, Pennsylvania, Delaware, District of Columbia, Maryland, Virginia and West Virginia, will be held at the William Penn Hotel, Pittsburgh, October 17 and 18, under the auspices of the National Tuberculosis Association. Dr. Thomas McCrae, Philadelphia, is president, and the program is in the main devoted to the discussion of tuberculosis war problems. The chief topics announced are: "Health Education of the Civilian Population in War Times," "The Need of Adequate Tuberculosis Programs in War Times," and "Adequate Care of Tuberculous Soldiers."

FOREIGN

Deaths in the Profession Abroad.—Dr. **R. Saundby,** emeritus professor of medicine at the University of Birmingham, a former president of the British Medical Association, aged 79. His book on medical ethics reached a second edition in 1907, and he had a wide reputation as a clinician, administrator and author.——Dr. **Margaret Todd,** medical officer to the Edinburgh Hospital for Women and Children, known as a writer under the pseudonym "Graham Travers."——Dr. **J. Vera,** a neurologist and alienist of Madrid, member of the board of the Beneficencia provincial.——Dr. **A. Meadoza,** the pioneer in microphotography in Spain, chief of the laboratory of the Beneficencia provincial and of the scientific institute in charge of Cajal. He took a prominent part in stamping out epidemics of cholera in 1884 and later.

SOUTH AND CENTRAL AMERICA, MEXICO AND WEST INDIES

Circulating Library Founded to Add to Hospital Fund.—At Bogota a circulating library has been founded to aid Hospital San José. Books are donated and the fees for circulation are given to the hospital.

Elections of Officers.—The Sociedad de Cirugia of Bogota at its recent annual meeting elected Drs. L. C. Marquez, president; M. Rueda, secretary, and Dr. H. Machado, director of the work of the Hospital de San Jose.——The Sociedad de Pediatria elected Dr. J. M. Montoya, president, and Dr. J. Bejarano, secretary. The Club Medico, Dr. M. A. Iriarte, president; Dr. C. J. Lopez, secretary.

Buildings for the Medical School in Colombia.—The *Repertorio* of Bogota hails the inauguration of the new pavilions for the study of anatomy, histology and pathologic anatomy, which are to serve as the basis for the equipment for the study of medicine in the republic of Colombia. It states that a new era for the study of medicine is opening in the country, and the men who are to be thanked for it are Drs. L. C. Marquez, president of the Academia Nacional de Medicina, H. Machado, rector of the medical faculty, and P. Martinez. They have accomplished what others regarded as a dream incapable of realization.

MEXICO LETTER

Mexico City, Sept. 23, 1918.

Eighth Anniversary of Founding of University

As yesterday was the eighth anniversary of the founding of the National University here, it was celebrated with a musical-literary ceremony in the morning, in the amphitheater of the National Preparatory School, attended by all connected with the university. Addresses were made by the rector of the university, Dr. J. N. Macies, who spoke in Latin. After these ceremonies a portrait of the late Dr. J. E. Liz, LL.D., who was the first rector of the university, was placed in the rector's office.

At noon a banquet with 150 covers was served in the Chapultepec restaurant, the rector presiding, with the members of the university faculties, the professors and a number of alumni. Among the guests were Mr. H. P. Fletcher, the ambassador from the United States, the Duke de Amalfi, the minister from Spain, and also the ministers from Uruguay and Nicaragua, the president of the city council, and other dignitaries. The culminating note of the conviviality was the toast that the American ambassador offered, expressing his desire to work for the interchange of university professors and students between Mexico and the United States. Señor Fletcher's address, frank, loyal and cordial, elicited enthusiastic "vivas" for the American Union, Spain and President Wilson.

The National University of Mexico was founded under the auspices and patronage of the Universities of California, Oviedo (Spain) and Paris.

Regulation of the Practice of Medicine

The legislature of the state of Jalisco has passed laws regulating the practice of the profession in that state. Before entering on practice in Jalisco, a professional degree is now required of lawyers, physicians, pharmacists, engineers, veterinarians, obstetricians and dentists. These requirements are to be enforced under penalty of fine or imprisonment, except that at points where there are no qualified persons the practice of lay persons will be tolerated. Holders of degrees from foreign schools will have to present their diplomas for verification or submit to an examination. The president of the state has not yet signed the law. Jalisco is the first state in Mexico to enact any law of the kind in this matter, which is of such transcendental social importance. Elsewhere in the country there are no legal restrictions on the practice of unqualified practitioners of medicine and other professions.

Personal

At the request of the rector of the National University, Dr. N. Leon has been appointed the representative of Mexico in the Congreso de Americanistas, which is to convene at Rio de Janeiro in June, 1919. Dr. Leon is professor of anthropology at the National Museum, and has been the official representative of Mexico at various American international gatherings. He is a pupil of Prof. A. Hrdlicka of Washington, and is known in the scientific circles of the American Union.

Dr. T. G. Perrin has been elected a member of the Pedro Escobedo Medical Society, and his inaugural address was entitled "Our Attempts at Bacteriotherapy." It made a good impression. Dr. Perrin is a pupil of Cajal, and is a distinguished Spanish pathologist and bacteriologist who has been residing here for several years.

Dr. F. C. Najera has returned from New York, where he has been on an official commission, and has resumed charge of the Juarez Hospital.

New Medical Periodical

With August began the publication of the *Revista Medica,* at the city of Puebla, which comes to fill the vacuum left by the suspension of nearly all the medical periodicals of the country. The *Revista* aspires to be the organ of the medical corps in Mexico, and although the first number leaves something to be desired, we can hope that with time it will improve. The directors of the periodical are Drs. F. Bello and F. L. Casian, the latter director of the Medical School at Puebla. Dr. A. Cabrera, governor of the state, guarantees the expenses of the publication until it becomes self-supporting.

Sugar Treatment of Tuberculosis

The Mexican consul in Italy reported to the government the statements of Dr. D. Lo Monaco of Rome in respect to the benefit from subcutaneous injections of an isotonic and sterilized solution of saccharose in cases of pulmonary tuberculosis. He said that this cures or at least relieves the tuberculous and, what is still more interesting, the tubercle bacilli disappear from the sputum. The Departamento de Salubridad has established a free public dispensary in which these injections are given to needy patients who apply. Arrangements have also been made to supply physicians with ampules of the solution of saccharose ready for use, with the single condition that they will inform the sanitary authorities of the results of treatment to learn whether they fulfil the flattering promises of the Italian professor.

BUENOS AIRES LETTER

Buenos Aires, Aug. 24, 1918.

Epidemic of Typhus

The sanitary commission in charge of Professor Kraus of this city has established the existence of an epidemic of typhus in the provinces of Salta and Jujuy. In 1916 a commission, composed of Drs. Neiva and Barbará, had observed a clinical case and collected data testifying to the existence of this disease, until then not known certainly in Argentina, although it is known in Peru, Bolivia and Chile. Before this there had been only a suspicion of the existence in Argentina of a small epidemic among some recently arrived Russians a few years ago. The data collected by the commission now prove that typhus exists in almost an endemic form in the moun-

tainous and scantily populated provinces of Salta and Jujuy. In the town of Molinos there have been numerous cases, with fourteen deaths among the sixty cases encountered by Dr. Fernandez who was sent to combat the epidemic. At Mendieta (Jujuy) there were four deaths in nine cases, but the general mortality to date seems to have been about 20 per cent. The reason why this disease has not been recognized before was because the endemic foci are in such remote and almost uninhabited regions far from the towns and railroads.

Changes in University Staffs

The conflict that has been going on in the University of Cordoba has grown more acute. The rector and several of the members of the faculties have presented their resignations. The head of the national government has appointed the minister of public instruction to take charge of the matter personally, and reorganize the staff of the university. At the request of the minister of public instruction, the medical faculty of the university of Buenos Aires did not appoint a new dean at the close of the term of office of Dr. Bazterrica, and this post is filled provisionally by the member of the university council who has been longest in office, Dr. E. Canton, until the reorganization of the university statutes has been sanctioned.

Professor of Pathologic Anatomy

Dr. J. Llambias, at present the *intendente municipal* of the city of Buenos Aires, has been appointed professor of pathologic anatomy in the faculty of medicine of the University of Buenos Aires.

PARIS LETTER

PARIS, September 12, 1918.

Campaign Against Malaria

In a previous letter mention was made of an important communication by Dr. Marchoux, physician-in-chief of the Place de Paris, on the campaign against malaria (THE JOURNAL, Sept. 15, 1917, p. 926). Marchoux insisted particularly on the fact that systematic microscopic examinations of the blood would reveal the parasites of malaria two or three days before the appearance of the febrile attack, and the patient could then be sterilized by the administration of a few grams of quinin. As a matter of fact, hospitalization is not the solution of the question, for the majority of malaria patients need care only during the paroxysms, which occur at irregular intervals. The hospitals should not be filled up by men who do not need constant care. On the other hand, these men cannot be returned to military duty because they may be incapacitated by an attack at any time. The solution of this problem has been found by the creation of the antimalaria dispensary of the Pasteur Institute. This dispensary will keep these patients under observation during the period of development of the hematozoon, making frequent examinations of the blood, so that the appearance of the next paroxysm may be anticipated and be prevented by a prophylactic dose of quinin. If it is possible to check the paroxysms and the multiplication of the hematozoon which is the direct cause of the attack, the patient will have to deal with only one generation of hematozoa, diminished in numbers and in virulence, and thus an important step toward a cure will have been taken.

The dispensary has been installed in a large hall of the hospital of the *centre de réforme* at Vaugirard. It is provided with a series of small stalls separated by wooden partitions, and here come, at the day and hour specified, the patients who are under treatment. The microscopic examination of the blood is made by a group of young army physicians who are specializing in this work. All the other work which is to be done in this department is assigned to Red Cross nurses. Ordinarily a blood examination would consume much time, but by resorting to the so-called "thick drop" method, *la goutte épaisse*, with the hemoglobin removed, first proposed by Ronald Ross and perfected by Tribondeau, these examinations can be made very quickly.

The essential feature of this antimalaria dispensary is the fact that the patient is not hospitalized. The Service de Santé is not put to any expense. The malarial soldier is placed where he can be of most service; he may be placed in the auxiliary service, but, as a rule, he works at his trade in Paris. Therefore, he is not unproductive during the course of his treatment.

Campaign Against Poisonous Gases

For the purpose of instituting proper measures to combat the toxic or poisonous gases used by the Germans, especially the gas known as mustard gas or "ypérite" (so named because it was used for the first time at Ypres), a bathing and cleansing service has been organized by the Service de Santé militaire. It has been discovered that if the victims of these vesicating gases, like "ypérite," are given a bath and proper care within three hours after exposure to the gas, complications will not, as a rule, occur.

Each section for the disinfection of clothing and the douching of the gassed is mobile. It consists of a motor lorry or truck and a trailer. The truck transports the tent, the douche or bath apparatus, floor boards and other necessary accessories. The trailer carries a stove to disinfect the clothing. The whole outfit can be set up very quickly, and it operates in a very simple manner. The men undress in a part of the tent, separate from the bathing outfit. Their clothing is placed in the disinfecting apparatus while they are bathing, and on leaving they receive their clothing which has been freed of every trace of "ypérite." Forty men at a time can be douched; one hundred can be taken care of in an hour by one outfit. The Service de Santé intends to supply each division with one of these outfits.

There has also been organized a special clinic for the treatment of gas victims. This clinic is installed in the school of commerce (hôpital auxiliaire 101 de l'Union des Femmes de France), and is under the scientific direction of Dr. Ch. Achard, professor of pathology and general therapeutics in the Medical Faculty of Paris. This is at the same time a hospital where the gassed are given treatment and where army physicians are instructed in the methods of treatment applicable to these cases of gas poisoning. A research laboratory is attached to the hospital.

Mumps

At a recent session of the Académie de Médecine, Dr. Capitan read a very interesting paper based on his observation of 700 cases of mumps treated in his contagious disease service at the Hôpital militaire Bégin since the beginning of the war. Capitan directed special attention to a new sign, one which he has never failed to find, namely, a very distinct enlargement of the spleen appearing with the onset of the disease and disappearing at its termination. He has also seen in some cases a generally distributed reddish eruption which disappeared in the course of convalescence. Sometimes, though rarely, symptoms are present of irritation of the meninges at the base of the brain; they are not severe and disappear after eight or ten days. Capitan has observed one case of severe cerebrospinal meningitis as a sequel of mumps, but it terminated in recovery.

The Clinical Thermometer

A law has been passed which provides that after nine months no clinical thermometers can be delivered, placed on sale or sold without having first been subjected to verification. Each instrument must bear the name of its manufacturer and after verification it should be suitably stamped, bearing also the date of inspection. Infringements of this law will be punished in the same manner as the use of false weights or measures (a fine of from 11 to 15 francs); furthermore, the instrument will be seized and confiscated. Repetition of the offense will incur a fine of from 50 to 100 francs. In case of false branding, the culprit will be punished by imprisonment of from six months to five years.

Repatriation of Interned Persons

Word has been received from Geneva that the repatriation of the French interned, which has been interrupted for several weeks because of an epidemic of grip prevalent in Switzerland, will be resumed in the usual manner.

Evacuation of the Wounded by Waterways

On account of the difficulty of transportation of the wounded from certain sectors by hospital trains, the Service de Santé militaire has for some time been considering the establishment of a waterways transport for the evacuation of the wounded. However, no definite steps were taken to establish this transport without due consideration of all factors involved. During the recent battles more than 4,000 wounded were transported by water under the best conditions. Orders were issued to make a study of the waterways available for transport between the Oise, the Aisne and the Marne, and to provide the boats needed for such service. The wounded were far more comfortable in the boats than in the trains, which more than compensated for the longer time required to evacuate them. It is necessary, however, to equip the boats in such a manner that operations may be performed as is now done in the ambulances.

Deaths

Capt. George Shrader Mathers, M. C., U. S. Army, Chicago; Rush Medical College, 1913; a son of Dr. William R. Mathers, Prosper, Texas; a Fellow of the American Medical Association; died in Baltimore, October 5, of pneumonia; aged 31. Captain Mathers was a member of the staff of the John McCormick Institute for Infectious Diseases where he had done notable work in isolating the streptococcus in the nervous system in poliomyelitis, in studying the streptococci involved in acute epidemic respiratory infections in man and in studying a remarkable streptococcus epidemic in horses; also in an extensive study of meningitis in one of the military establishments. He entered the service as a lieutenant in March, 1918, and was stationed at Washington, D. C., at Newport News, Va., and finally as director of the laboratory in the base hospital at Camp Meade, Md. It was while working on material in connection with the present epidemic of influenza and the secondary pneumonia that Captain Mathers became a victim of the disease.

Died in the Service
CAPT. GEORGE S. MATHERS, M. C., U. S. ARMY, 1887-1918

Capt. Charles Henry Gallagher, M. C., U. S. Army, Ithaca, N. Y.; University of Syracuse, N. Y., 1896; aged 42; a Fellow of the American Medical Association; a specialist in anesthesia; whose military service commenced with a tour of duty at Fort Oglethorpe, Ga., when he was ordered to a replacement battalion at Allentown, Pa., and sailed to England, and then to France, where he was a member of the staff of Base Hospital No. 202, Orleans, France; died in that institution, August 28, from bronchial pneumonia.

Wilbur Alson Hendryx, New York City; Rush Medical College, 1874; aged 69; formerly a practitioner of Grand Rapids, Mich., and lieutenant-colonel in the Michigan National Guard; donor of a bacteriologic laboratory to the Medical College of Southern California, Los Angeles; more recently interested in mining; said to have been the inventor of the cyanid process of separating metal from ore, and of many types of mining machinery now in general use; died suddenly in Allentown, Pa., September 21.

Capt. Rae Wyant Whidden, M. R. C., U. S. Army, New York City; Harvard Medical School, 1911; aged 33; a Fellow of the American Medical Association and New York Academy of Medicine; a specialist in diseases of the lungs; visiting physician to Bellevue Hospital, assistant physician at the Presbyterian Hospital Dispensary and assistant surgeon to the Manhattan Eye, Ear and Throat Hospital; died at the Massachusetts General Hospital, Boston, September 25, from pneumonia, following influenza.

Col. Charles E. Doerr, M. C., U. S. Army; Medical College of Ohio, Cincinnati, 1906; aged 35; a Fellow of the American Medical Association; commandant of the Base Hospital at Camp A. A. Humphreys, Accotink, Va.; who entered the Medical Reserve Corps in 1908; was made first lieutenant, Medical Corps, in 1909, and promoted to captain, Medical Corps, in 1912; died at Camp Humphreys, October 3, from pneumonia, following influenza.

Uriah Newton Mellette, Bellingham, Wash.; Eclectic College of Medicine and Surgery, Cincinnati, 1858; aged 83; at one time a member of the Oklahoma State Medical Association; formerly a member of the Florida State Board of Health, and a member of the Oklahoma State Board of Pharmacy; was killed accidentally by a train in one of the tunnels of the Great Northern Railway, near Bellingham, September 22.

Lieut. John Lee Fisher, Assistant Surgeon, U. S. Navy, Wilmington, Del.; Hahnemann Medical College, Philadelphia, 1912; aged 30; a Fellow of the American Medical Association; who entered the naval service, Nov. 17, 1917, and was assigned to duty on the *U. S. S. Kearsarge;* died, September 24, in the U. S. Naval Hospital, Chelsea, Mass., from influenza.

Thomas William Kohr, Robertsdale, Hammond, Ind.; New York University, New York City, 1884; aged 75; a member of the Indiana State Medical Association; secretary and president of the board of health of Hammond from 1902 to 1905; proprietor of the Robertsdale Pharmacy; died at his home, September 20, from cerebral hemorrhage.

Lieut. Walter Irenaeus Ryder, U. S. N. R. F., Newton, Mass., and Boston; Tufts College Medical School, Boston, 1913; aged 29; a Fellow of the American Medical Association; stationed at the U. S. Navy Radio School, Harvard; died at his home in Newton, September 24, from bronchopneumonia, following influenza.

Capt. Cecil Goodard Morehouse, M. R. C., U. S. Army, Waukon, Iowa; State University of Iowa, College of Homeopathic Medicine, Iowa City, 1913; aged 30; a member of the Iowa State Medical Society; who had been on duty on the Western Front in France, is reported to have been killed in action, recently.

Lieut. Edward James Ware, M. R. C., U. S. Army, New York City; College of Physicians and Surgeons in the City of New York, 1885; aged 59; a Fellow of the American Medical Association and New York Academy of Medicine; visiting surgeon to the Bloomingdale Clinic; died at his home, September 30.

Carrie A. Frost, Almond, Wis.; Northwestern University, Womens' Medical School, Chicago, 1898; aged 53; a Fellow of the American Medical Association; for many years attending physician to the Home for Incurables, Chippewa Falls, Wis.; died at her home, September 22, from tuberculosis.

James Morgan Hurley, San Bernardino, Calif.; Cincinnati College of Medicine and Surgery, 1865; aged 75; at one time a Fellow of the American Medical Association; assistant surgeon, U. S. Army, during the Civil War; for several years health officer of San Bernardino; died at his home, September 25.

Died in the Service
IN FRANCE
MAJOR WILLIAM B. HUDSON, M. C., U. S. ARMY, 1870-1918
(*See The Journal, last week, p. 1157*)

Marland Cooper Eaton, Beverly, Mass.; Tufts College Medical School, Boston, 1906; aged 33; formerly a member of the Massachusetts Medical Society; at one time a member of the board of health of Wenham; died at his home, recently, from pneumonia, following influenza.

Butler Presson, Seattle; aged 87; at one time a member of the Grant County (Ind.) Medical Society; a pioneer practitioner and clergyman of the state of Washington; a veteran of the Civil War; died at the home of his daughter in Seattle, August 12, from senile debility.

Lieut. Gilbert Mord Newburger, U. S. N. R. F., Philadelphia; Medico-Chirurgical College of Philadelphia, 1905; aged 38; a Fellow of the American Medical Association; on duty at the Philadelphia Naval Hospital; died in that institution, September 27, from pneumonia.

William B. Bullard, Los Angeles; Bowdoin Medical School, Brunswick and Portland, Me., 1859; aged 89; at one time a

Fellow of the American Medical Association; a member of the Medical Society of the State of California; died at his home, September 23.

Emory J. Walker, New Haven, Conn.; Hahnemann Medical College, Chicago, 1868; aged 73; one of the founders of Grace Hospital, a charter member of its board and secretary of the institution since 1889; died at the home of his son in New Haven, September 9.

George William Yeaton, Milford, Mass.; Dartmouth Medical School, Hanover, N. H., 1902; aged 40; at one time a Fellow of the American Medical Association; a member of the Massachusetts Medical Society; died at his home, September 27, from influenza.

Phillip Townsend Buckley, Boston; Harvard Medical School, 1884; aged 58; a member of the Massachusetts Medical Society; died at his home, September 19, from pneumonia, following influenza.

Abraham P. Williard, Kirksville, Mo.; University of Maryland, Baltimore, 1850; aged 92; surgeon of U. S. Volunteers during the Civil War; died at his home, September 11, from arteriosclerosis.

Francis Joseph Colgan, Colorado Springs, Colo.; L.R.C.P. (Ireland), L.R.C.S. (Ireland), 1910; aged 32; died at a sanatorium in Colorado Springs, September 11, from pulmonary tuberculosis.

Herbert Abraham Hands, Cambridge, Mass.; College of Physicians and Surgeons, Boston, 1882; aged 66; died suddenly in Somerville, Mass., September 18, from heart disease.

Henry C. Carpenter, Lake Odessa and Howard City, Mich.; Homeopathic Hospital College, Cleveland, 1868; aged 82; died at farm home, near Howard City, September 13.

Francis Winfield Sapp, Columbus, Ohio; College of Physicians and Surgeons, Baltimore, 1882; aged 64; died at his home, September 20, from arteriosclerosis.

Whitfield Tillison, Eloise, Mich., formerly of Detroit (license, Michigan, years of practice, 1900); aged 80; died in the county house, Eloise, September 3.

S. Dawson Good, Ashtabula, Ohio; University of Wooster, Cleveland, 1892; aged 50; died at the home of his father in Ashtabula, September 15, from nephritis.

James Leander Forsythe, Lewistown, Ohio; Cincinnati College of Medicine and Surgery, 1875; aged 69; died at his home, September 14, from paresis.

C. W. Knickerbocker, Cedar Falls, Iowa; Hahnemann Medical College, Chicago, 1882; aged 60; died in Chicago, September 14, from heart disease.

Edward J. Buckley, Oak Park, Ill.; Rush Medical College, 1904; aged 40; died at the home of his parents in Lombard, Ill., September 24.

Marc Aurele Trudeau, Lowell, Mass.; University of Vermont, Burlington, 1899; died at the home of his brother in Canada, September 7.

William M. Safley, Townsend, Mont.; College of Physicians and Surgeons, Chicago, 1885; aged 60; died at his home, September 5.

N. A. McCoy, Jackson, Tenn.; Memphis (Tenn.) Medical College, 1855; aged 86; died at his home, September 9.

Josiah B. Custer, Bismarck, Ark. (license, Arkansas, 1903); aged 56; died at his home, September 17.

Marriages

CAPT. CHARLES WATKINS BROWN, M. C., U. S. Army, Nashville, Tenn., on duty at Vancouver Barracks, Wash., to Miss Anna Murphey of San Diego, Calif., at Portland, Ore., September 10.

LIEUT. MICHAEL FRANCIS MCGUIRE, M. R. C., U. S. Army, Chicago, to Miss Rhea F. Ferrin of Jamestown, N. Y., September 25.

LIEUT. RALPH AVERILL GOWDY, U. S. N. R. F., Minneapolis, to Miss Vera M. Unumb at Alexandria, Minn., September 16.

HENRY AUGUSTUS PETERS, Oconomowoc, Wis., to Miss Emma Nicolaus of Fort Atkinson, Wis., September 17.

GEORGE GIRDWOOD PEARCE, New Bedford, Mass., to Miss Elsie Bruce Jenney of Hyde Park, Boston, recently.

GLEN GODFREY GORDON, Baker City, Ore., to Miss Josephine Beaudoin of Joseph, Ore., September 7.

Correspondence

FRIENDLY SOCIETIES AND THE AUSTRALIAN PROFESSION

To the Editor:—I have been directed to inform you of the dispute that has been in existence for some months between the Friendly Societies of Victoria and the British Medical Association.

The lodge doctors have been paid for the past forty years on an average as little as 14s. per annum for the town; this includes attendance on the member and his family and works out at four persons for each member; for the country the average is 16s. per annum per member for the lodge doctor.

For a considerable period of time we held negotiations with the associated lodges called the "Friendly Societies Association" with a view to having the rate of remuneration increased. As the Friendly Societies refused our demands, 100 per cent. of the town members and 96 per cent. of the country members of the British Medical Association on the 31st of last October gave three months' notice of their intention to resign their appointments on the 31st of January of this year and asked for reappointment on the terms of a model lodge agreement that had been drawn up. The Friendly Societies Association refused our terms and established institutes at which the institute doctor was asked to attend from 3,000 to 5,000 patients. The government of the day was asked by the Friendly Societies to take a hand in settling the dispute. The commissioner found that the terms asked for by the British Medical Association were just and equitable. Both sides expressed their willingness to accept the finding of the Royal Commission; but the British Medical Association made it a condition that the institdte which had been established should be abolished. They were unwilling to see their men sacrificed for their loyalty to the association in that they had tendered their resignations and were to be left without any means of livelihood should the commissioner's findings be accepted unconditionally.

The lodges are endeavoring to extend their institutes, but find a difficulty in procuring medical practitioners. One of our most bitter opponents, the late president of the Friendly Societies Association, Mr. Samuel Mauger, is now on his way to Canada; and it was stated in Parliament that he purposes securing 1,000 medical officers from America to fill the positions of lodge medical officers vacated by the members of the British Medical Association in what was termed by the commissioner to be "a just demand." The institute doctors are ostracized by other members of the medical profession and are not met in consultation.

My council would esteem it a favor if you would put a "warning notice" in THE JOURNAL advising any medical practitioners in your country who might think of applying for any of the positions which might be advertised in your daily newspapers that they should first of all apply for information. By so doing you would be conferring a great favor on our association.

C. STANTON CROUCH, Secretary,
Victoria, Melbourne, Australia.

ANESTHETISTS AND ANESTHETIC TECHNICIANS

To the Editor:—A gradually increasing misconception of the art of anesthesia has led to a rather unique condition of affairs.

We find that nurses and other lay persons may, by the simple acquisition of a few rules, become anesthetists. Large institutions have adopted the nurse anesthetist on grounds of economy, expediency and even sentimentality. It is argued that these workers can be employed at little expense, that the supply meets the demand, and that the feminine element eliminates fear and works for smoothness during the induction of the anesthesia.

These institutions may employ lay persons to take their roentgenograms and to make urinary, blood or sputum exami-

nations, but does any one dream of speaking of these workers as the hospital roentgenologist or the attending pathologist? They are employed as technicians. The nurse who administers an anesthetic is an anesthetic technician. She can never be more without a medical degree, for in order to understand the language of anesthesia one must have intimate acquaintance with anatomy, physiology, medicine, surgery, diagnosis, psychology and special branches.

The nurse who in discussion with a medical man attempts to defend a theory relating to anesthesia cannot fail to feel the presumption of it and, if graced with wit, to see the absurdity of such a position. Yet it has actually come to pass that medical men have suffered themselves to be instructed by a nurse in the theory and practice of anesthesia.

In justice to an important branch of surgery and to our medical confrères who devote their training and their energy to its development, let us drop the term "anesthetist" as applied to its nonmedical workers and adopt the term "anesthetic technician."

Paluel J. Flagg, M.D., New York.

A PHYSICIAN'S FINANCES

To the Editor:—I do not believe that advertising in a daily newspaper and in the physician's waiting room, and the sale to the highest bidder of his unpaid accounts, as advocated by physicians and noted under "Editorial Comments" in the September issue of the *Journal of the Michigan State Medical Society*, is the proper remedy for people who do not pay their physician. A more radical one is needed. Since the physician must consummate one of the great fundamental instincts of human life, that of self-preservation, or making a living, why not strike at the root of the evil, calling a spade a spade, and not beat around the bush? The health of the physician, which is his greatest asset, suffers by the fatigue of long hours in trying to conserve human life. He responds to the public's call the entire twenty-four hours of the day, while even the common laborer has the law's protection to work no more than eight—the physician being the only worker who wears himself out for people who do not pay.

A political board or the claim adjuster of an insurance company should not be permitted to fix a doctor's fee. The individual who fails to pay his physician a small fee for saving his life will pay a lawyer thousands of dollars to be saved from the penitentiary.

To keep himself efficient the physician requires both money and recreation; hence he should take the honest, fearless course, demanding spot cash payment or giving no service. Those who declare this remedy too harsh or drastic should remember that the physician has suffered long from the moth-eaten abuse, and because patients will not protect him he must protect himself unless he wants to qualify as a medical missionary. The public can profitably have a law enacted that will be a protection in case of illness not only against the overworked general medical practitioner, but also against the weary medical specialist who employs inexperienced assistants to care for his great swarm of patients—this law to limit the amount of work the physician undertakes, because beyond a certain point, as his practice increases, his efficiency to the ill diminishes.

I am of the opinion that, eventually, in the interest of both physician and patient, the state will not only graduate the physician but will support him after graduation with a just compensation—one that will be great enough to guarantee him, not only a living, but also professional necessities for which, under the present system, it is his lot to struggle.

I have been in the general practice of medicine since 1890 on the site of my birthplace in Detroit, treating patients from all sections and classes of the city. For the twenty years ending Dec. 31, 1909, during which time I treated every ill patient that applied, only 2 per cent. paid promptly, and 60 per cent. failed to pay me anything. Profiting by this experience, on Jan. 1, 1910, I adopted my present rule, to ask every new patient before he receives service if he can pay my fee. If his reply is negative he is told that I carry no accounts with strangers and that he must seek treatment from the Detroit Public Welfare Commission free medical clinics and dispensaries, or elsewhere. For the eight and a half years ending June 30, 1918, of my total number of new patients, 47 per cent. were refused treatment, the balance paying cash and obtaining my services. Expenses dropped with diminished business, leaving my average net income per month for this period 276 per cent. more than my average net returns per month for the preceding twenty years, although it was an amount not more than that earned by the average Detroit salaried layman. The rule gives me more time for refreshment, reading and sleep—all needed to make for physical and mental efficiency in serving such of the ill as apply who are willing to pay promptly. I need not say that dead beats, deliberate grafters and delinquents make a rigorous howl against my business methods, although I treat all applicants known to be honest indigents free of charge.

Because of my experience of nearly thirty years, I recommend to physicians who have not medical missionary ambition, instead of the "schemes" above mentioned and pending the time when they will be paid out of the annual public tax budget, that they do a strictly cash business with patients whose credit is not known to be first class—the honest indigents alone excepted—and to require those with such good credit to keep their accounts paid up at least every thirty days.

John Linn Irwin, M.D., Detroit.

ENTEROCOLOSTOMY FOR ACUTE OBSTRUCTION OF THE TERMINAL ILEUM FROM INFECTION IN THE PELVIS AND LOWER ABDOMEN

To the Editor:—In his article in The Journal, Sept. 7, 1918, Dr. B. M. Anspach recommends an enterocolostomy for acute obstruction of the terminal ileum caused by infection in the pelvis, and cites clinical results. I am heartily in accord with his report and wish to emphasize my opinion by citing an article I wrote in the *Boston Medical and Surgical Journal* (1913, **169,** 313) in which I advocated this identical procedure for just such obstructions and reported three successful cases. Since then I have had four more, one in a child aged 4 years, all successful. I had operated on my first three patients previous to an article by Cheever (*Boston Medical and Surgical Journal* (1913, **168,** 719) in which he first described this type of obstruction of the terminal ileum from suppuration in the pelvis, the condition in his cases and mine being due to the appendix. He advocated enterostomy, which proved fatal in two out of three cases reported.

W. Sampson Handley (*British Journal of Surgery*, 1915, **3,** 157) reports a similar condition, in addition a portion of the pelvic colon being obstructed by this inflammatory exudate, two areas of the intestine involved, to which he aptly applies the term "ileus duplex." He advocated ileocolostomy if the anastomosis could be performed below the area obstructed, and if that was impossible, to perform an ileocolostomy above the obstruction in the colon and in addition a cecostomy to drain the contents of the colon and ileum.

A colostomy or enterostomy for an obstruction is often a life-saving procedure and no doubt is not performed frequently enough; but when an anastomosis of the obstructed intestine to a point low in the colon, where absorption is nil, can be performed, with results equally as good, it is to be advocated in preference to drainage to the surface, which not only is an additional care but requires a second operation for its closure.

Dr. Anspach's report is interesting and confirms a procedure which I believe I was the first to report in August, 1913.

C. A. Roeder, M.D., Omaha.

Dispensary as a Social Agent.—The province of the dispensary is extending far beyond the clinic walls, until it now reaches out into the community as a public agent. This is the need which has brought about a readjustment by the injection into the operation of dispensaries social service principles and public welfare interests.—Lucy C. Catlin, The Hospital as a Social Agent in the Community.

Book Notices

NERVE WOUNDS: SYMPTOMATOLOGY OF PERIPHERAL NERVE LESIONS CAUSED BY WAR WOUNDS. By J. Tinel, Preface by Professor J. Dejerine. Authorized Translation by Fred Rothwell, B.A., Revised and Edited by Cecil A. Joll, M.B., M.S., B.Sc. Senior Surgeon Richmond Military Hospital, Cloth. Price, $4.50. Pp. 317, with 323 illustrations. New York: William Wood & Co., 1917.

This work has been prompted by the great number of nerve wounds produced by war injuries. There were 639 cases which formed the basis of this study, and of these, 408 involved the upper and 231 the lower extremities. A brief synopsis on the character of the injuries, the changes that take place in the nerve, degeneration and regeneration, and the formation of neuromas and pseudoneuromas forms the opening part of the first chapter. The general subject is then subdivided into four parts. Part 1 is devoted to a general survey, and consists of five chapters, on nerve lesions in war wounds, clinical examination of a nerve, electrical examination, clinical types, and general diagnosis of peripheral nerve lesions. Part 2 deals with the nerves of the upper limb and Part 3 with those of the lower limb. Part 4 presents the conclusions, some of which are interesting and may be mentioned:

We are justified in affirming that the prognosis of peripheral nerve lesions is, on the whole, favorable.

Every peripheral nerve affected by traumatism tends to regenerate.

Widespread destruction of peripheral nerves is also repairable by nerve grafting.

Nerve suture practiced under favorable condition almost invariably succeeds.

Early intervention does not appear to be an indispensable condition; we have witnessed the success of nerve sutures practiced thirteen and fifteen months after the wound.

The author, by reason of his large experience in war injuries, has been able to present in this work a valuable contribution to our knowledge of traumatic nerve lesions.

FIBROIDS AND ALLIED TUMOURS (MYOMA AND ADENOMYOMA): THEIR PATHOLOGY, CLINICAL FEATURES AND SURGICAL TREATMENT. By Cuthbert Lockyer, M.D., B.S., F.R.C.P., Vice-President Obstetrical and Gynaecological Section, Royal Society of Medicine. With an Introductory Notice by Alban Doran, F.R.C.S., Consulting Surgeon to the Samaritan Free Hospital for Women. Cloth. Price, $25. Pp. 603, with 316 illustrations. New York: The Macmillan Company, 1918.

Dr. Lockyer has had an extensive experience, both as a clinician and as a gynecologic pathologist, during many years of work in the Samaritan Hospital, London. This volume embodies his own observations, as well as those of many other prominent workers, and may be regarded as the latest and most important work that has been written on the subject. The book consists of three parts, considering, respectively, myoma, adenomyoma and operative measures. It is illustrated in the most comprehensive manner, and both text and drawings are highly creditable to the publishers; indeed, it is one of the finest medical publications that has been produced in Great Britain in recent years.

An elaborate analysis of the work is not possible within the limits of a review article. It is a great storehouse of observations, theoretical considerations occupying but a small portion of the contents. In Part I, on secondary changes in myoma, full consideration is given to malignant complications, the author having no doubt as to the possibility of malignant transformation of the myoma cell. He points out that while sarcomas of connective tissue origin are either spindle-cell or round-cell those of muscular origin are invariably spindle-cell. Regarding hyaline degeneration, he states that this condition is often a precursor of or intimately connected with sarcomatous change. The rarity of tubal gestation in myoma uteri is emphasized, and the fullest consideration is given to the association of uterine pregnancy and myoma. Most opportune is the section dealing with radiotherapeutics. This is a valuable summary of extensive observations from various sources regarding treatment by the roentgen ray, radium and mesothorium. Lockyer believes that radiotherapy acts chiefly by destroying the ovaries, but that the roentgen ray has also a direct influence on the myoma cells, though this is variable in producing atrophic changes and shrinkage. Indeed, he is skeptical as to the ability of the roentgen ray to cause permanent atrophy in myoma. Radium and mesothorium used alone are not so suitable as the roentgeon ray, as no shrinkage of the growth can be expected. Radiotherapy should be employed only when the myoma is not complicated by adhesions, degeneration and other new growth. The contraindications outweigh the indications for radiotherapy.

Part II, dealing with adenomyoma, is a masterly review of our knowledge of this growth, and can be recommended as a valuable work of reference. The etiologic analysis gives full consideration to the wolffian origin hypothesis of von Recklinghausen, the mucous membrane origin so strongly urged by Cullen, the inflammatory theory of mucosal invasion, the embryonic or congenital theory, and the serosal theory. Lockyer believes that heterotopy of serosal epithelium is the probable explanation of the existence of epithelial spaces and cysts in most of the extra-uterine swellings found between the rectum and the genital tract. There is also a detailed description of these tumors as found in the fallopian tubes, round ligaments, ovarian ligaments, broad ligaments, rectogenital space and alimentary tract. The author is of the opinion that adenomyomas very rarely become malignant. They are more frequently associated with pelvic peritonitis than myomas. Radiotherapy is unavailing in the treatment of these tumors, and may excite inflammatory processes.

Part III, dealing with surgical measures and with postoperative complications, is written in a manner that gives evidence of a wide and sound clinical experience.

The author and publishers of this important volume are to be highly congratulated on its production. It should find a place in every medical library in America.

LOCAL AND REGIONAL ANESTHESIA, WITH CHAPTERS ON SPINAL, EPIDURAL, PARAVERTEBRAL, AND PARASACRAL ANALGESIA, AND ON OTHER APPLICATIONS OF LOCAL AND REGIONAL ANESTHESIA TO THE SURGERY OF THE EYE, EAR, NOSE AND THROAT, AND TO DENTAL PRACTICE. By Carroll W. Allen, M.D., Assistant Professor of Clinical Surgery at the Tulane University of Louisiana. With an Introduction by Rudolph Matas, M.D., Professor of General and Clinical Surgery at the Tulane University of Louisiana. Second edition. Cloth. Price, $6.50 net. Pp. 674, with 260 illustrations. Philadelphia: W. B. Saunders Company, 1918.

The perusal of this book will prove interesting to any one who is at all concerned with the subject of local anesthesia. From the standpoint of the practical surgeon there is a great deal of valuable material, most of which evidently is presented only after prolonged, careful observation and trial by the author and his associates. There is much that may be given instant approbation; there is also much, particularly in connection with major procedures, that the prudent surgeon might not feel justified in applying unless the indications were of the most urgent nature. It must be admitted that the author is judicially conservative and that in general the discussion is well balanced—there is no overzealous praise of pet procedures. The first eleven chapters deal with the history and theory of local anesthesia, an analysis of fifteen or twenty local anesthetics with a chapter on toxicology, and a thorough presentation of the principles of technic. The remainder of the book consists largely of descriptions of the various operations possible under local anesthesia.

NAVAL HYGIENE. By James Chambers Pryor, A.M., M.D., Medical Inspector, United States Navy. Published with Approval of the Surgeon-General, U. S. Navy and by Permission of the Navy Department. Cloth. Price, $3 net. Pp. 507, with 153 illustrations. Philadelphia: P. Blakiston's Son & Co., 1918.

The author has been in service on board ship and in naval stations, and has taught naval hygiene in the United States Naval Medical School. The book is based on the need for a text of this character as shown by the work of the classes in the United States Naval Medical School. The problems on board ship are different from those of Army camps. Thus the question of air aboard ship and of ventilation assumes far greater relative importance than in military camps. In the same way the question of water supply and sewage disposal aboard ship are special problems. In fact, all of the problems of hygiene and sanitation in the Navy are distinctly special in character. The civilian physician called to active service in the Naval Medical Reserve Force will, therefore, find this textbook of great value. It is well illustrated, quite elementary and very practical.

Medicolegal

Burden of Proof on Party Given Wrong Medicine on Prescription

(Fagan v. McRae (N. Y.), 169 N. Y. Supp. 577)

The Supreme Court of New York, Appellate Term, First Department, reverses a judgment for $500 that was rendered in favor of the plaintiff, and orders a new trial, on the ground that the plaintiff failed to sustain the burden of proof in this action against a druggist who was charged with having failed to fill a prescription given by the plaintiff's physician according to its directions. The court says that the defendant admitted the filling of the prescription, but denied that it was incorrectly filled. The medicine was prepared and delivered by the defendant on Tuesday. The plaintiff was given the medicine every three hours. On Thursday the physician called, and the plaintiff had by that time taken two thirds of the contents of the bottle. She had become very sick on Tuesday night, and had grown worse. The physician was shown the bottle on Thursday, and found the contents to be of whitish color, with much sediment. The medicine prescribed was of a clear brownish color. After that the plaintiff took no more of the wrong medicine. She continued ill, and was treated by the physician for three months. The defendant offered no evidence. The proof that the defendant had delivered a medicine different from the one ordered by the physician seemed to be adequate. The court was thus called on to determine what injury, if any, was caused by the error. Although the plaintiff was ill for three months, it nowhere appeared in the record what her ailment was at any time; in fact, it did not appear that the physician himself knew. All the court had were vague suggestions that the plaintiff might have been suffering from so-called German measles. The only evidence from which any inference might be drawn as to the effect of the wrong medicine was the physician's testimony that the plaintiff's condition was made worse; that the medicine certainly was bad for the plaintiff. The witness, being unacquainted with the ingredients of the medicine, could have had no reason for his conclusion, other than the circumstance that a different medicine was given. The fact that the plaintiff grew worse might, for all that appeared, have simply been due to the failure of the patient to receive the benefit of the remedy prescribed. The burden was on the plaintiff to show that the result of the wrongful act of the defendant—the giving of the wrong medicine—was the proximate cause of the injury claimed to have been suffered. The plaintiff failed to sustain the burden.

Liability of Lessors for Death from Failure to Heat Premises

(Keiper v. Anderson et al. (Minn.), 165 N. W. R. 237)

The Supreme Court of Minnesota affirms an order overruling a demurrer and holds that an action was maintainable that was brought by a woman as administratrix to recover damages for the death of her husband alleged to have been caused by the wrongful acts or omissions of the defendants in failing properly to heat a store building which they had leased to her husband and contracted to keep heated to a comfortable and proper temperature. The complaint stated the terms of the contract and alleged negligence and carelessness on the part of the defendants in failing properly to attend to the heating as the cause of Mr. Keiper's death. The defendants demurred, contending that the action could not be maintained because it was on contract, and because the statutory action to recover for death by wrongful act or omission could be maintained only when the cause of action was in tort. The court says that it is doubtless true that the word "tort," as well as the word "wrongful," usually signifies a breach of legal duty, independent of contract rights. But this is by no means always true. Take such contract relations as carrier and passenger, physician and patient, attorney and client, landlord and tenant; when there is actual negligence or wrong on the part of the carrier, physician, attorney or landlord, is it not still negligence or a wrong notwithstanding that the duty is imposed by the contract? There may be a breach of contract without negligence, but there may be negligence or wrongful acts or omissions in the performance of a contract. It seems to the court to make no difference whether the duty to use due care is one imposed directly by law or exists because of the contract relation of the parties. The court is unable to see why the complaint in this case did not allege negligence on the part of the defendants and that Keiper's death was caused by their wrongful acts and omissions.

Society Proceedings

COMING MEETINGS

American Association of Railway Surgeons, Chicago, Oct. 16-18.
American Public Health Association, Chicago, Oct. 14-17.
Assn. for S. & P. of Inf. Mort., Asheville, N. C., Nov. 11-14, 1918.
Southern Medical Association, Asheville, N. C., Nov. 11-14, 1918.
Virginia State Medical Society, Richmond, Oct. 22-25.
Western Roentgen Society, Chicago, Nov. 20-22.

COLORADO STATE MEDICAL SOCIETY

Forty-Eighth Annual Meeting, held at Estes Park, Sept. 9-11, 1918

The President, Dr. Edward Jackson, Denver, in the Chair

Operations for Gastric and Duodenal Ulcer

Dr. A. R. Pollock, Monte Vista: The surgical methods of treating stomach and duodenal ulcer are: 1. Gastro-enterostomy. 2. Direct attack of the ulcer, with or without gastro-enterostomy. 3. Pyloric closure with gastro-enterostomy, with or without direct attack of ulcer. 4. Gastroduodenostomy. 5. Resection of stomach, gastro-intestinal continuity reestablished by (*a*) anastomosing proximal and distal ends as is done in sleeve resection; (*b*) by the second method of Billroth as is done after pylorectomy; (*c*) by gastro-jejunostomy, the Polya operation, following extensive resection of stomach, or by (*d*), antecolic gastrojejunostomy, as described by Balfour. The operation should be adapted to the case.

DISCUSSION

Dr. C. B. Lyman, Denver: There is a great difference of opinion among surgeons as to what procedure should be carried out in different cases. Gastro-enterostomy is done more frequently than any other operation, but it is not a perfect procedure. Patients return with various symptoms. The right method may not have been used. The operation is done as a mechanical one and must be done right. The opening between the jejunum and stomach may have been made so close to the pylorus that there was no drainage, or the opening may be too small. The gastro-enterostomy opening must be made much larger at the time of operation than seems necessary so as to provide for future contraction.

Dr. C. D. Spivak, Denver: Surgeons are beginning to realize that operations for ulcer of the stomach, no matter what method is used, are not always successful. The patient is not cured.

Dr. Frost C. Buchtel, Denver: The essayist leads us to believe that we must exercise a certain amount of judgment in the selection of the operation, depending on the type of ulcer. Gastro-enterostomy cures a very large percentage of cases of peptic ulcer after they have had half a dozen so-called medical cures. Many of the cases of peptic ulcer are duodenal ulcers, and gastro-enterostomy is the best type of operation for duodenal ulcer. Some of our bad results from gastro-enterostomy come from the fact that we expect the operation to cure gastric ulcer, which it does not do. I think that surgeons are now agreed that direct attack of the ulcer, usually with some form of drainage operation, is desirable in gastric ulcers.

Dr. A. R. Pollock, Monte Vista: Chronic ulcer is a surgical condition. It is true that some patients are not relieved by gastro-enterostomy, but gastro-enterostomy in itself is not sufficient. Something more should be done.

The Contributions of Colorado Physicians to Medical Literature, and The Journal of the American Medical Association as the Index

DR. C. D. SPIVAK, Denver: Medical literature comprises the following classes: 1. Literature of all the branches of medical sciences as taught in all the medical schools, including those usually called irregular. 2. Literature of all other sciences and arts so far as they are applied to and have a bearing on the medical sciences. 3. Biographies of medical men and of scientists who have contributed to the advancement of medicine. 4. History of medicine. 5. The writings of medical men outside of medical science in which the influence of their medical training may be discerned. 6. General literature which has a specific bearing on or reference to medicine and physicians. About 1900 THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION introduced new forms, new type, new departments. The number of readers increased, the number of advertisers multiplied. THE JOURNAL became a prosperous concern, a big business. Nothing succeeds like success. Those who scorned the idea of having their name associated with the plebeian periodical published in the wild and woolly West sat up and took notice, and then flocked to THE JOURNAL with their contributions. For who is so blind as not to see that a periodical, the circulation of which is rapidly nearing the 100,000 circulation mark, is a better medium than that of any medical publication in this country, the circulation of the best of which never exceeded 25,000 copies?

Dermatitis Seborrhoeica

DR. G. P. LINGENFELTER, Denver: No treatment will be successful unless it is thoroughly recognized that the scalp is the important factor in connection with the general disease. It is an excellent plan to remove the oil and the greasy plugs by means of deodorized benzin before applying the remedies. This is a most satisfactory and effective cleansing agent, and is much less irritating to the skin than ether. Lesions on the face are best treated by means of lotions, and for this purpose the lotio alba, with a small amount of sulphur added, serves admirably.

An excellent combination is: ammoniated mercury, 1.3 gm.; liquor carbonis detergens, 4 gm.; petrolatum, 3 gm. A paste is made and applied several times a day to the dry scaling patches frequently seen at the border of the scalp.

The thickened epidermal patches (seborrheic warts) of middle aged or elderly persons can be removed by the use of keratolylic remedies, such as salicylic acid, or by repeated exposures of the roentgen ray, by the curet, or by the application of carbon dioxid snow. The latter remedy nearly always gives satisfactory results from a cosmetic standpoint, and recurrences have been very infrequent. It is much safer and speedier than the roentgen ray, and because of the freedom from possible undesirable effects is much to be preferred. Recently, as an adjuvant to local treatment, I have had satisfactory results with the Alpine sun lamp, employing sufficient exposure to produce an intense erythema.

Necessary Cooperation in Prenatal Care and Obstetrics

DR. FOSTER H. CARY, Denver: Prenatal care should begin as soon after the advent of pregnancy as possible. The public should be educated to the importance of seeking advice soon after conception has occurred. The excellent results following the establishment and intelligent conduct of prenatal clinics have been evident not only in the diminution of avoidable complications at labor, but also in the end-results months postpartum. Many physicians fail to impress on patients the necessity of frequent visits to the office for examination. Prenatal care embraces a careful family and personal history, an early and complete examination, blood pressure readings, a Wassermann test, pelvic measurements, bimanual examination for displacements in the early months before the fundus has risen above the symphysis, urinalysis and detailed instructions as to hygiene, diet, exercise, work and excesses. The social service worker is best adapted to work in prenatal care. Her position makes it easy for her to inspire confidence and to act as a great factor in the establishment of cooperation between the charities and the physicians or hospitals.

Absolute Rest in the Treatment of Pulmonary Tuberculosis

DR. S. W. SCHAEFER, Colorado Springs: Tuberculous patients usually come to us below par in body and nervous energy and weary in mind. Rest in bed is one of the chief aids in building up the run-down body; antibodies must be formed to combat the tubercle bacilli. Instead of wasting the small store of energy the patient still has, in holding himself erect or sitting or moving about, all this energy should be concentrated on fighting the disease.

Eversion of Tissue Margins in Wound Approximation

DR. C. E. TENNANT, Denver: The most successful repair of a wound occurs when there is an accurate approximation of the various layers of tissue. Since most of these tissues are of but knife-blade thickness, it stands to reason that cell proliferation will not bridge the gap so well when these narrow margins are barely approximated with the average method of suturing, as when brought side to side by eversion. As a rule, the result of wound healing will be satisfactory in a reverse ratio to the amount of granulation tissue produced or required in the process of repair. This eversion is secured by placing a tenaculum at each angle of the incision in the layer of tissue to be united and put the tissue on the stretch. The layers to be sutured then come well out of the wound, the margins become everted, and with a good strong thumb forceps the operator grasps the everted edge, including both margins, and the needle is engaged in what seems to be one layer of tissue. The ordinary over-and-over suture or lock stitch is used for a short distance. At various intervals along the line a continuous mattress suture is dropped in order to keep the tissues in eversion when they fall back into the wound, and then again the over-and-over suture is applied for a short distance. These two types of suture are used at various intervals until the layer of tissue is completely approximated. The next layer is then sutured in like manner.

Blood Transfusion

DR. FROST C. BUCHTEL, Denver: An analysis of the last 100 blood transfusions I have given shows the following results: 46 of the 100 were given for pernicious anemia; 16 for bleeders (purpura hemorrhagica and hemophilia); 14 for acute hemorrhages; 12 for secondary anemia; 11 to prepare patients for operation (9 of this list are also included in other groups); 7 for sepsis; 1 for shock; 1 for malnutrition, and 1 for Hodgkin's disease, making a total of 109, 9 of which were counted twice. The acute hemorrhage cases give brilliant results. The transfusions under this heading were given for the following conditions: 3 for gastric hemorrhage; 3 for postoperative bleeding; 1 for hemorrhage in typhoid fever; 2 for placenta praevia; 1 for premature separation of the placenta; 1 for postpartum hemorrhage; 1 for ruptured ectopic gestation, and 1 for hemorrhage from papilloma of the bladder. Among these fourteen transfusions for acute hemorrhage there were three deaths.

There is a great field for transfusion in preparing patients for operation. Seven of the eleven patients in this group could not have been operated on at all without the transfusion. All the patients stood the operation well.

Tuberculosis in Children

DR. GEORGE CATTERMOLE, Boulder: Recent studies have made it more certain that tuberculosis is contracted chiefly in infancy and childhood. The percentage of children that are infected before the age of 15 years varies according to locality. Between the ages of 4 and 15 years there are not many children who show active tuberculosis. Before 4 years of age, tuberculosis of the bronchial glands, meninges, peritoneum and lungs is common. After 4 years the most common seat is in the bronchial glands, the cervical glands are also often involved, and, in a smaller number of cases, the joints. The mortality from tuberculosis is low between the ages of 4 and 15 years, even though the number of children that react to the skin tests gradually increases during these years. These children have a high degree of resistance to tuberculosis, and it is then that they should acquire immunity. In those children that have active lesions in the joints, glands or peritoneum, there is a marked tendency to heal.

It is very difficult to diagnose tuberculosis in children from physical signs in the chest. The skin tests should be used in order that we may know all of the children that are infected with tuberculosis. I am in favor of a general test of all schoolchildren. It would enable us to study the progress and development of the disease and to determine whether those that are infected in childhood or those who are infected in later life are the ones who make up the army of consumptives.

Tuberculin skin tests were made by me on 419 children. Of these, 47 per cent. showed a positive and 53 per cent. a negative reaction. One hundred and sixty-five patients showed 42 per cent. positive and 58 per cent. negative reactions. Two hundred and fifty-four charity patients showed 50 per cent. each of positive and negative reactions. Of 167 children tested at the university dispensary, 47 per cent. were positive and 53 per cent. negative, even though a large number of these children were from families in which there were one or more cases of tuberculosis. Of eighty-seven children examined at the orphans' home, 57 per cent. gave positive and 43 per cent. negative. This was the highest percentage of positive reactions obtained in any group of children, probably because of the fact that these children came from homes in which one or both parents had died of tuberculosis.

A history of exposure was obtained in 202 cases. Among 101 children that gave a negative reaction, sixty-one had been exposed to tuberculous parents and had escaped infection, while forty had not been exposed to infection in the home. This is a little more evidence of exposure in the home as being the chief cause of tuberculous disease in children.

(*To be continued*)

Current Medical Literature

AMERICAN

Titles marked with an asterisk (*) are abstracted below.

American Journal of Insanity, Baltimore

July, 1918, **75**, No. 1

1 Traumatic and Emotional Psychoses. So-Called Shell Shock. J. R. De Fursac, Paris.—p. 19.
2 Insane Psychoneurotic. L. G. Lowrey, Boston.—p. 53.
3 Pathology of Choice Reactions. F. L. Wells and H. A. Sturges. —p. 81.
4 Some Familial and Hereditary Features of Amaurotic Idiocy. I. H. Coriat, Boston.—p. 121.
5 Relation of Alcohol to Mental States. R. Armstrong-Jones, London.—p. 133.
6 Historical Pathology; Case of King Louis XI of France. C. Robinson, Princeton, N. J.—p. 155.

American Journal of Obstetrics and Diseases of Women and Children, York, Pa.

August, 1918, **78**, No. 2

7 *Escape of Foreign Material from Uterine Cavity into Uterine Veins. J. A. Sampson, Albany, N. Y.—p. 161.
8 Ossification Centers of Fetal Pelvis. F. L. Adair, Minneapolis. —p. 175.
9 *End-Results of Conserved Ovary. J. O. Polak, Brooklyn.—p. 199.
10 Shall We Cut and Reconstruct Perineum for Every Primipara? R. H. Pomeroy, Brooklyn.—p. 211.
11 *Medical Teaching and Research After the War. J. G. Clark, Philadelphia.—p. 220.
12 *Bladder of Women After Operation. A. H. Curtis, Chicago. —p. 230.
13 *Most Effective Methods of Control of Venereal Diseases. J. M. Baldy, Philadelphia.—p. 238.
14 *Why the Midwife? J. C. Edgar, New York.—p. 242.
15 Obstetrician's Responsibility for Conservation of Infant Life. C. Foulkrod, Philadelphia.—p. 255.
16 Pernicious Anemia Complicating Pregnancy; Report of Case. P. Findley, Omaha.—p. 262.
17 *Complete Exstrophy of Bladder with Split Pelvis as Complication of Pregnacy. C. J. Miller and E. L. King, New Orleans.—p. 267.
18 Pelvic Peritonitis of Female Genitalia Origin. A. B. Keyes, Chicago.—p. 274.
19 Malignant Tumors of Breast: Résumé. C. F. Nassau. Philadelphia.—p. 283.
20 Case of Fetus Papyraceous with Twin Pregnancy. G. C. Mosher, Kansas City, Mo.—p. 288.

7 and 11. Abstracted in THE JOURNAL, June 15, 1918, p. 1885.

9, 13, 14 and 17. Abstracted in THE JOURNAL, June 22, 1918, p. 1975.

12. Abstracted in THE JOURNAL, June 22, 1918, p. 1974.

American Journal of Physiology, Baltimore

August, 1918, **46**, No. 5

21 Significance of Reaction to Shading in Chiton. W. J. Crozier and L. B. Arey, Chicago.—p. 487.
22 Reactions of Frogs to Heat and Cold. E. S. Brooks.—p. 493.
23 *Epinephrin Vasodilator Mechanisms. F. A. Hartman, L. G. Kilborn and L. Fraser, Toronto.—p. 502.
24 *Constriction from Epinephrin Acting on Sympathetic and Dorsal Root Ganglia. F. A. Hartman, L. G. Kilborn and L. Fraser, Toronto.—p. 521.
25 Multiple Sensory Activities of So-Called Rhinophore of Nudibranchs. L. B. Arey.—p. 526.
26 *Acapnia and Shock. Venopressor Mechanism. Y. Henderson and S. C. Harvey, New Haven, Conn.—p. 533.
27 *Influence of Drugs on Intestinal Rhythmicity. W. C. Alvarez, San Francisco.—p. 554.
28 Motor Functions of Cecum. W. C. Alvarez and E. Starkweather, San Francisco.—p. 563.
29 *Histologic Study of Fat Contained in Mucosa of Alimentary Tract of Moderately Starved Cats. W. A. McIntosh, Baltimore.—p. 570.
30 *Extirpation of Duodenum. L. R. and C. A. Dragstedt, J. T. McClintock and C. S. Chase, Iowa City, Iowa.—p. 584.
31 *Venopressor Mechanism. D. R. Hooker, Baltimore.—p. 591.

23. **Epinephrin Vasodilator Mechanisms.**—That sympathetic vasodilators to the limb exist and that they are sensitive to epinephrin at the gangliar and peripheral ends is the conclusion reached by Hartman and his associates. While a limb is dilating from denervation, epinephrin produces an increase in volume with difficulty, but while the reverse change is taking place the dilator effect of epinephrin begins to reappear. After denervation of a limb, of greater duration, the dilatation from epinephrin occurs from a greater range of doses than is the case in the normal limb. The peripheral action (dilatation) becomes similar in both normal and denervated limbs after perfusion. Under these conditions also dilatation occurs with a greater range of doses. Depressor doses of epinephrin can cause dilatation of a limb by action on the gangliar mechanism. Epinephrin acts on both gangliar and peripheral mechanisms in producing dilatation of the hind limb.

24. **Vascular Response of Epinephrin on Nerve Ganglions.**—The authors found that epinephrin occasionally produces constriction in the hind limb by its action on the sympathetic and dorsal root ganglions. Constriction of the intestine is sometimes produced by epinephrin acting on the superior mesenteric and dorsal root ganglions.

26. **Acapnia and Shock.**—The purpose of this paper is to present facts indicating that, in addition to indirect vasomotor nervous influences, there is a peripheral chemical control of the volume of the venous return, and reasons for holding that it is this chemical control which is the chief factor in the high venous pressure of muscular work and in the lowering of venous pressure induced by acapnia and itself causing the circulatory depression following anesthesia and surgical operation. Two series of experiments were made. The general significance of the results obtained appears to be as follows: Procedures which strongly influence vasomotor innervation, for instance, spinal section, spinal stimulation, stimulation of an afferent nerve, splanchnic stimulation and intravenous injection of epinephrin, cause on the whole decidedly greater alterations of arterial than of venous pressure, and the alterations of venous pressure are often only momentary and therefore largely indirect and secondary to redistribution of blood. In the beheaded cat increase of carbon dioxid in the blood (with ample oxygen), which has little or no effect on arterial pressure other than an increased amplitude of pulse, causes an enormous rise of venous pressure. The pressure develops gradually as the carbon dioxid accumulates in the tissues and falls again gradually as the excess of carbon dioxid is ventilated out of the body.

These facts, and others, indicate the existence of a venopressor mechanism distinct from the vasomotor nervous regulation and consisting in a peripheral chemical control, largely through variations in the carbon dioxid content of the venous

blood, over the venous pressure and the volume of the venous return. As venous pressure and the volume of the venous return are essential elements in the diastolic filling of the heart, and thus are factors in determining the volume of blood circulated in unit time, it appears probable that the venopressor mechanism may play a part in the increased circulation during muscular exertion. It thus assists in coordinating the volume of the blood stream with the energy expenditure and gaseous metabolism of the tissues. As it is now generally admitted that in shock it is the decreased venous return which is the cause of the fall of arterial pressure, the relation of carbon dioxid to the venopressor mechanism affords an explanation of the mode by which acapnia induces circulatory failure.

27. **Influence of Drugs on Intestinal Rhythmicity.**—Sets of five segments from different parts of the bowel were studied by Alvarez under identical conditions in a beaker of aerated Locke's solution. Of the seventy-five drugs tested, eight increased the rate, forty-six slowed it and twenty-one had no effect. Calcium chlorid, calcium lactate, benzene, nicotin, ammonia, sodium hydrate, potassium hydrate and mercuric chlorid increased the rate. Marked slowing was produced by alum, antimony potassium tartrate, carbon dioxid, cascara, chloral hydrate, digitalis, ergot, formaldehyd solution, hydrochloric acid, ipecac, jalap, phenylhydrazin, potassium cyanid, quinin salts, senna, and sodium citrate and nitrite. With a number of the drugs the rate of the ileal segment was more affected than that of the duodenal segment; and there was a gradation in the percentage of increase or decrease from one end of the bowel to the other. This suggests that the rate in the upper part of the intestine is more stable and perhaps more nearly maximal than it is in the ileum.

Drugs which increase or decrease the tone and amplitude of contraction do not necessarily affect the rate. Thus, pilocarpin and barium chlorid, which increased the tone, decreased the rate. Calcium salts, which increased the rate, diminished the amplitude of contraction. This suggests two phases of muscular metabolism acted on, one concerned with tone and amplitude, the other with the rate. Digitalis slows the intestinal contractions much as it slows those of the heart. Excepting those cases in which the colonic rhythm was stopped entirely, it was practically unaffected by the drugs which caused marked changes in the rate of the small intestine.

29. **Fat in Alimentary Mucosa of Starved Cats.**—McIntosh claims that normally there is fat in the epithelial cells of the stomach and intestine which is not associated with the phenomenon of fat absorption; that this normal fat varies, however, with some definite cycle of functional activity of the cells themselves; that at certain periods the lipoids are in such a condition that they can be demonstrated by histologic methods while at others they are not demonstrable. The normal presence of these lipoids must be taken into account in estimating experimental results.

30. **Extirpation of Duodenum.**—The experiments here reported indicate that animals can survive indefinitely a complete extirpation of the combined jejunum and ileum. A dog was kept three months after a complete removal of the pyloric part of the stomach, the entire duodenum and the upper jejunum. The mucosa of this region of the digestive tract is not comparable to the suprarenals or parathyroids in function. The normal secretions of the duodenum and jejunum are not toxic. When bacteria are excluded from the lumen of the intestine, various pathologic changes even to complete occlusion of the blood supply to an isolated piece of intestine with resulting autolysis and reabsorption, can take place without the elaboration of sufficient toxic substances in the cells themselves or in their secretions to kill the animal. The duodenum does not excrete in the duodenal juice any substance necessary for life or for the function of the intestine lower down.

31. **Venopressor Mechanism.**—A preparation of the large intestine in the dog is described by Hooker on which a rise of venous pressure may be demonstrated independently of arterial and other factors. The rise of venous pressure may be obtained by (*a*) stimulation of the nerve to the part (peripheral mechanism); (*b*) stimulation of a sensory nerve (central reflex mechanism), and (*c*) central stimulation by asphyxia. Attention is called to the fact that activity of the intestinal muscle may contribute to the movement and pressure of the blood in the portal venous system.

Archives of Pediatrics, New York

August, 1918, **35**, No. 8

32 *Parenteral Administration of Fluids to Infants and Children. A. C. Silverman, Syracuse.—p. 449.
33 *Spinal Fluid in Anterior Poliomyelitis. J. H. Larkin and L. H. Cornwall, New York.—p. 459.
34 Educational Value and Opportunities of Baby Health Stations. J. Sobel, New York.—p. 468.
35 Case of Scurvy with Summary of Fifty Other Cases. S. McLean, New York.—p. 477.
36 Case of Toxic Meningitis Following Measles. F. Tweddell, Summit, N. J.—p. 482.

32. **Parenteral Administration of Fluids.**—Silverman's personal experience with puncture of the longitudinal sinus comprises some twenty cases. Some were done for diagnostic purposes—for obtaining blood for a Wassermann test or for chemical analysis or for blood culture. In the majority of instances, intravenous injections of salt solution, glucose or sodium bicarbonate were given. In no case were any untoward symptoms observed incidental to the injection. Some severe cases of cholera infantum have shown a marked improvement after a single injection of salt solution intravenously. In one case in which the heart had apparently stopped, experience with experimental animals suggested the use of epinephrin, and a suitable dose in normal saline was injected into the sinus with most gratifying results. The accumulated experience of the past three years gives sufficient evidence of the usefulness of this method. It should be remembered that it is used in exceedingly sick babies in whom the prognosis is at best unsatisfactory.

33. **Spinal Fluid in Poliomyelitis.**—Observation made in fifty cases leads Larkin and Cornwall to believe that the increase of the pressure is the most persistent of the changes in the spinal fluid and that it does not disappear until several months after the acute symptoms have subsided. After the tenth day it is present in nearly 100 per cent. of cases. An increase in pressure occurred in 93.5 per cent. of fluids examined from the first to the fifteenth day of illness. It persisted longer than any of the other fluid changes. Of the fluids, 93 per cent. showed an increase in the globulin content. This increase was noted before the pleocytosis and persisted longer. A pleocytosis occurred in 86 per cent. of fluids. The lymphocytes, especially the small variety, predominated. The cells diminished before the globulin. The total leukocytes of the blood were highest during the first ten days, averaging 18,500. As the total leukocytes diminished there was a relative increase in the polymorphonuclears. There was no curve noted with the Lange colloidal gold reaction diagnostic of anterior poliomyelitis. No parallelism existed between the colloidal gold curve and the other spinal fluid or blood findings. There appeared to be a tendency for the height of the colloidal gold curves to increase with the severity of the infection. The higher curves were more frequent from the tenth to the fifteenth day. Of the colloidal gold curves 63 per cent. were humped. Of the five fatalities among forty-nine cases, one fluid gave a curve to two, three fluids gave curves to three, and one fluid gave a curve to four. Three of the fluids from fatal cases were humped or of the syphilitic type, and two were descending, resembling the paretic type.

Boston Medical and Surgical Journal

Sept. 19, 1918, **179**, No. 12

37 Fatigue and Exhaustion. J. M. Taylor, Philadelphia.—p. 385.
38 Scarlet Fever Carriers. D. M. Lewis, New Haven, Conn.—p. 389.
39 Treatment of Essential Facial Neuralgia by Local Alcoholization. J. A. Sicard, France.—p. 392.
40 Ultraviolet Light Symptomatic Cure for Eczema. J. Bryant, Boston.—p. 394.

Florida Medical Association Journal, Jacksonville

August, 1918, **5**, No. 2

41 Practical Points in Ophthalmology for General Practitioner. W. H. Adams, Jacksonville.—p. 21.

Journal of Laboratory and Clinical Medicine, St. Louis

August, 1918, 3, No. 11

42 *Communicable Diseases in National Guard and National Army of United States During Six Months from September 29, 1917, to March 29, 1918. V. C. Vaughan and G. T. Palmer, Washington, D. C.—p. 635.

42. **Communicable Diseases in United States Army.**—This report has been prepared with the object of giving publicity during the present year to the salient features of communicable disease incidence in the United States Army during the past winter. The statistical data have been drawn from the telegraphic reports sent in weekly from each camp, cantonment and army post or station. The data given deal for the most part with thirteen National Guard camps and sixteen National Army cantonments, which represent over 70 per cent. of the troops in this country during the period in question.

It was seen that the average death rate (9.1) for the whole army is higher than that of New York (5.5), St. Louis (5.5), Pittsburgh (6.2), Chicago (5.2). The death rates in the different camps show wide variation. In three National Guard camps it was between 23 and 29 per cent.; in three between 10 to 1 per cent.; in two between 8 and 9 per cent.; in five between 2 and 3 per cent. In the National Army camps, the death rate was 30.7 in one camp; between 10 and 20 per cent. in four; between 7 and 9 in three; between 5 and 6 in three; between 3 and 4 in four, and under 3 in one.

The reasons for the wide variations in the death rates in the different camps is a difficult one to ascertain. (1) Some of the camps have acted as filters through which many troops have passed, leaving their most unfit on the filter. In a general way it can be stated that those camps which may be designated as closed camps and which have been least employed as filters are the healthiest camps. (2) Under similar conditions the negro is more susceptible to the acute respiratory diseases than the northern man. Southern whites are more susceptible to these diseases than are the northern whites. It is an opinion generally held by medical officers in southern camps that hookworm disease and chronic malarial infection increase susceptibility to the acute respiratory diseases. (3) There is no reason for believing that either morbidity or mortality in any camp has been due to faulty sanitation, as we usually understand this term. All the camps are kept clean, have unquestioned water supplies, satisfactory garbage and sewage removal, etc.

Comparing the National Army and the Guard, it will appear that the death rates have been practically the same among soldiers in tents and those in barracks. Comparing the National Guards of certain states and the National Army from the same states it is seen that the death rate in the National Army has, in each case, been higher than in the National Guard. This is probably due to the fact that the National Guard contained more seasoned troops than the National Army.

The diseases which have been responsible for the greatest number of deaths in the Army during the period covered by this report are the acute respiratory diseases. These may be named in the order in which they have caused deaths, as follows: pneumonia, meningitis, measles, scarlet fever and diphtheria. With the addition of tuberculosis these have caused 77 per cent. of all deaths. Sixteen per cent. of deaths have been due to other diseases, and 7 per cent. due to causes other than disease, such as mechanical injuries. The acute respiratory diseases have caused an excessive death rate in the Army compared with that due to the same causes in civil life. Pneumonia has caused by far the greatest number of deaths in the Army, and has been responsible for about 80 per cent. of total deaths caused by all the respiratory diseases. Each respiratory disease, except tuberculosis, has caused an excessive fatality in army life. It is evident that the low tuberculosis death rate in the Army is due to the elimination of those with active forms of this disease. Furthermore, it is probable that most of the deaths from tuberculosis in the Army have been due to the activation of inactive foci by acute respiratory diseases.

While both pneumonia and meningitis have exacted the greatest toll in life, they have not been as important a factor in incapacitating troops as some other causes. Measles is a large factor in this connection. The annual morbidity rate for measles for all troops in this country during the six months' period was 105 per thousand. The rate for pneumonia was 24.2, that for meningitis 4.1. Pneumonia and meningitis are the more fatal diseases and therefore, although fewer cases occur, the number of deaths is great. The fatality rate, or case mortality rate, for all troops during the six months' period has been 23 per cent. for pneumonia, 27 per cent. for meningitis and 0.1 per cent. for measles. Most numerous as causes of sickness are those less fatal ailments such as colds, influenza, bronchitis and mumps.

The National Army with its new recruits fresh from civilian life shows the highest rate in venereal diseases and meningitis. National Guard troops, however, show the highest rates for measles, pneumonia, malaria and typhoid. Regular Army troops, representing those longest in the service and in all probability an older average age, show the lowest rates in everything but scarlet fever and venereal disease, the latter being slightly above the rate for the Guard. Measles, pneumonia, meningitis and scarlet fever have existed in epidemic form in a number of the camps. Measles has been by far the most prevalent of the four. Scarlet fever has been of minor consequence. Typhoid has been a negligible factor as a cause of incapacitation. Mumps, bronchitis and influenza have likewise been widespread and although not fatal in themselves, have frequently been forerunners of pneumonia.

Vaughan and Palmer point out that to hope to reduce infection among our soldiers to the minimum without adequate attention to the health of the civilian population from which the soldier comes and with which he mingles more or less freely is without justification. All the infections which have appeared in the camps are distributed among the civilian population from which the soldiers in the camp have come. If the draft men were organized and drilled in small squads at home and gradually inducted into military life, and only those found to be free from infection sent to the camps, the control of communicable disease among the soldiers would be greatly aided. Meningitis has been most prevalent in those camps whose soldiers come from areas in which this disease has been endemic. The same thing is true of scarlet fever. Typhoid and paratyphoid occurred in only three camps and even here the incidence was very low. There were twelve camps that did not have a single case of typhoid or paratyphoid. It would be difficult to put forward testimony of a more striking nature as to the efficacy of the preventive measures now being utilized in the Army against typhoid. The American soldier today has found the army camp a safer place to dwell, so far as typhoid is concerned, than in the most favorably situated civilian community.

An extended review of the situation shows that the greatest single factor in the prevalence of disease in certain camps and their absence in others has been the natural susceptibility of the men. There have been added those aggravating factors such as exposure, fatigue, lack of warm clothing, cold quarters by day, cold quarters and insufficient bedding by night. In order to prevent a recurrence of the trouble, the authors suggest: First and foremost it seems necessary to graduate the introduction of civilians into army life. The change has been too abrupt. Men should be called first to a semiactive reserve army. Here they should get drill and the essentials of sanitation and self-care by lecture and by demonstration. The drill and calisthenics should be the hardening process. After this the transfer should be made to camp where a man's entire time is given over to his military training.

Before entering camp men should be examined for incipient disease. The suspects should be separated and watched before their dispatch to camp. Vaccination for typhoid and smallpox can be completed while in the reserve force. Once established in camp the transfer of men from one camp to another should not take place without a careful examination and removal of those who show signs of illness. This will prevent this all too frequent transportation of sick men, who are dangerous to others because of their sickness. These precautions together with care in the proper mixture of work and rest, judicial selection in the quality and balancing of the

food ration, the adequate protection of the man, especially the one from the warm climate, against cold and exposure, his protection against the sick through effective quarantine measures, and discretion in the use of the physical hardening process should moderate to a large degree the experiences of the past winter.

Journal of Medical Research, Boston

July, 1918, **38**, No. 3

43 *Investigations of Tropical Sunlight, with Special Reference to Photodynamic Action. A. W. Sellards, Boston.—p. 293.
44 Action of Extreme Ultraviolet of Tropical Sunlight on Complement Power of Serum. W. T. Bovie.—p. 335.
45 Complement Destruction as Measure of Effects of Radiation. S. C. Brooks, Boston.—p. 345.
46 *Immunity and Tissue Transplantation. Comparison of Heterotransplantation and Homoiotransplantation. M. S. Fleisher, St. Louis.—p. 353.
47 *Simple Method (Patient's Diluted Blood) for Blood Cultures. J. G. Wurtz, Pittsburgh, and S. W. Sappington, Philadelphia. —p. 371.
48 *Studies on Circulation of Kidney in Relation to Architecture and Function of Organ in Health and Disease. L. Gross, Toronto. —p. 379.
49 *Some Unusual Blood Cells in Diseases of Bone Marrow Origin. W. C. Thro, New York.—p. 385.
50 *Grafting of Tissues into Nearly Related Individuals in Rat, and Mode of Inheritance of Individuality—Differentials. L. Loeb, Washington, D. C.—p. 393.
51 Studies on Bacteriemias in Agonal Period. D. G. Richey and C. Goehring, Pittsburgh.—p. 421.
52 *Experimental Production of Lesions, Erosions, and Acute Ulcers in Rabbits, by Repeated Injections of Pilocarpin and Epinephrin. G. A. Friedman, New York.—p. 449.
53 Studies on Importance of Lymphocyte in Cancer Immunity. M. J. Sittenfield, New York.—p. 465.
54 Congenital Atresia of Esophagus without Other Malformation. C. T. Crowdy, Montreal.—p. 469.
55 Hernia Diaphragmatica Vera (Congenital Absence of Left Side of Diaphragm, Dextro Cardia; Tubular Stenosis (Coarctation) of Aorta Malformations of Liver and Lung). L. Gross, Toronto. —p. 473.
56 Corpora Amylacea in Lungs and Hamartomatous Nodules in Small Intestine Occurring in Case of Diaphragmatic Hernia into Left Pleura with Strangulated Bowel. L. Gross, Toronto.—p. 476.
57 Spina Bifida with Splitting of Cord by Exostosis from Vertebral Body. E. Smith, Montreal.—p. 479.
58 Degeneration, Senescence and New Growth. H. Oertel, Montreal. —p. 485.
59 *Treatment of Lobar Pneumonia with Antipneumococcus Serum. P. Kyes, Chicago.—p. 495.

43. **Investigations of Tropical Sunlight.**—It is by no means thoroughly established that sensitization to light in a photodynamic sense occurs spontaneously, even in the lower animals. Sellards claims that as yet there is very little evidence that such sensitization plays any significant part either in the etiology or therapy of the diseases of man.

46. **Immunity and Tissue Transplantation.**—A series of experiments in which both rabbit and guinea-pig kidney were transplanted into both rabbits and guinea-pigs was carried out by Fleisher. Guinea-pig kidney transplanted into guinea-pig shows active regeneration at an earlier period than does the same kidney transplanted into rabbits; eventually the degree of regeneration is the same in both animals. Rabbit kidney transplanted into rabbit shows far better regeneration than does the same tissue transplanted into guinea-pig. At best the rabbit kidney does not show as good regeneration as does the guinea-pig kidney. The connective tissue reaction is more marked about homoiotransplants than about heterotransplants. In general the connective tissue reaction is more marked in the guinea-pig. The rabbit seems to be a relatively better soil for the growth of guinea-pig kidney than is the guinea-pig for rabbit tissue. Fleisher failed to find evidence in his experiments that the leukocytic and connective tissue reactions are the factors of greatest importance in the poorer growth of heterotransplants, but he is inclined to believe that while these reactions may have some effect, the body fluids, through either the presence of injurious substances or the lack of substances necessary for the growth of the heterotransplant, are more important.

47. **Patient's Blood for Blood Cultures.**—According to Wurtz and Sappington the patient's blood diluted in a test tube of sterile water makes an excellent culture medium for a number of infections, at the same time furnishing the infecting organism. Evidence of this was found in fifty cases of croupous pneumonia yielding 38 per cent. of positive cultures, nineteen cases of streptococcus infection giving 47.3 per cent. of positive results, and seventeen typhoids with 64.7 per cent. positives. In pneumococcus and streptococcus infections, the method compares quite favorably with other cultural procedures; and in positive cases the bacteriologic diagnosis can be made in nearly every instance from the primary culture within twenty-four hours. In typhoid infection the bile method is superior on account of the time element, but if the slower growth is not prohibitive, the percentage of positive results with blood water will probably equal that with bile. The authors do not feel sure of the optimum dilution of blood for this work, but suggest 30 to 40 per cent. if only one tube is made, and a 5 to 10 per cent. and a 40 per cent. tube if two are taken. It is important to insure sterility of the water. The simplicity and economy of the method are obvious, and suggest its availability outside of hospitals.

48. **Circulation of Kidney.**—In contracted kidney Gross says there is a marked change from the normal in parenchymatous and vascular arrangement. The cortex is largely eliminated and has become passive, whereas the pyramids are preserved and better vascularized, possibly to take on a more active participation in the work in the kidney than in the normal physiologic sphere. This means renal insufficiency and perversity. It is justifiable to assume that these, together with the concomitant metabolic disturbances, gradually upset the economy of the whole organism, and ultimately are, at least largely, responsible for uremia and death.

49. **Unusual Blood Cells in Diseases of Bone Marrow Origin.**—In making a routine examination of the blood of a dispensary patient, the examination of the stained smear brought to light an unusual blood picture. The smears, from which the drawings were made, were stained with Hastings' modification of the Nocht-Jenner stains. The hemoglobin with the Dare was 45 per cent. The red cell count was 1,500,000. Index was high, that is 1.5. White blood cells numbered 4,000 to 5,000. In counting 300 leukocytes an equal number of nucleated red cells was noted down. Nucleated red cells of the three ordinary types were seen, that is, normoblasts, intermediates and megaloblasts. The cell called Turck's stimulation form was also present. The cells that interested Thro particularly correspond to the descriptions of Naegeli's myeloblasts or Turck's lymphoid marrow cells. In Thro's experience only one other case with pernicious anemia had a blood picture like the one described. These two patients had all the blood changes of pernicious anemia with the addition of cells characteristic of those found in so-called acute lymphatic leukemia, and it seems such are correctly designated by calling them cases of leukanemia.

50. **Grafting of Tissues.**—Loeb states that tissues transplanted from parents to children or from sisters and brothers to sisters and brothers, or from children to parents, behave in a manner intermediate between tissues after homoiotransplantation and autotransplantation. The difference between results obtained after transplantation from parents to children, and after transplantation of tissues from an animal to his sisters and brothers, is so small that it may be entirely accidental. Tissues transplanted from children to mother also show an intermediate behavior. All degrees of variation between the two extremes of results resembling those in autotransplantation on the one hand, and of homoiotransplantation on the other hand, are obtained after transplantation of tissues into near relatives.

52. **Experimental Production of Lesions.**—In all the rabbits injected by Friedman with pilocarpin, lesions, erosions, or acute ulcers were demonstrated in the mucosa of the stomach. In the rabbits injected with pilocarpin and epinephrin, lesions in the mucosa of the stomach and duodenum were evident. From these experiments it is clear, therefore, that through repeated injections of pilocarpin alone, lesions or acute ulcers were obtained in the stomach, while alternate injections of both pilocarpin and epinephrin produced in addition lesions or erosions in the duodenum.

59. **Antipneumococcus Serum Treatment of Lobar Pneumonia.**—Kyes reports 115 cases of acute lobar pneumonia in which the patients were treated with an antipneumococcus serum, and compares the mortality among these cases with the mortality in 538 similar cases of pneumonia occurring in the same institution during the same period, but not so treated. The antipneumococcus serum was produced by injecting massive doses of virulent pneumococci into the domestic fowl. Of the 538 patients not treated with the antipneumococci serum, 244 died—the death rate being 45.3 per cent. Of the 115 similar patients treated with the serum, twenty-four patients died—the death rate being 20.8 per cent. In the ward in which the serum was employed the death rate during the six weeks prior to the introduction of the serum treatment was 55 per cent. During the six weeks subsequent to the withdrawal of the serum treatment, the death rate was 51 per cent. These statistics show that among those cases treated with the antipneumococcus serum the death rate was less than one-half the rate obtaining among the similar cases not so treated, be they cases occurring in other wards during the same period, or in the same ward at other periods of the same year. This is the essential proof which Kyes has to offer that the antipneumococcus serum in question is of distinct value in the treatment of acute lobar pneumonia in man.

Journal of Urology, Baltimore

June, 1918, **2**, No. 3

60 *Study of Primary Hydronephrosis. J. T. Geraghty and W. A. Frontz, Baltimore.—p. 161.
61 *Absorption of Drugs and Poisons from Bladder and Urethra. Absorption of Various Alkaloids, Antiseptics, Local Anesthetics and Salts. D. I. Macht, Baltimore.—p. 211.
62 Effect of Administration of Urea on Ratio Between the Rate of Urea Excretion and Concentration of Urea in Blood in Experimental Glomerulonephritis. C. K. Katanabe, New York.—p. 227.
63 New Operation for Epispadias. H. H. Young, Baltimore.—p. 237.
64 Flexible Metallic Ureteral Sound with Filiform Guide. H. W. E. Walther, New Orleans.—p. 253.

60. **Primary Hydronephrosis.**—A study of their material showed Geraghty and Frontz that the most frequent cause of so-called primary hydronephrosis is an inflammatory contraction at the ureteropelvic junction, and that more careful microscopic study of this region in cases of hydronephrosis, without apparent cause, will disclose this lesion in a large percentage of them. In many cases in which aberrant blood vessels, renal mobility, or abnormal implantation of the ureter have been assigned as the cause of the hydronephrosis, careful examination of the upper ureter and pelvis will reveal inflammatory narrowings which have unquestionably played the primary rôle. When the kidney is extensively destroyed, nephrectomy, if not contraindicated, should be carried out. When the kidney, however, possesses valuable renal function or when a bilateral condition contraindicates nephrectomy, the various plastic procedures outlined above offer considerable prospect of success.

61. **Absorption of Drugs from Bladder and Urethra.**—Macht's experiments showed that a large number of drugs and poisons can be and are absorbed from the urethra, and that the absorptive power of the bladder is very poor as compared with that of the urethra. A review of clinical evidence agrees with the experimental findings. Poisoning through the urinary tracts has been reported and is not uncommon. The absorption of a large number of drugs and poisons—alkaloids, antiseptics, salts and local anesthetics—from the bladder and the urethra in the male was studied.

Kansas Medical Society Journal, Topeka

September, 1918, **18**, No. 9

65 Enlarging Scope of Neurologic Surgery. E. Sachs, St. Louis.—p. 211.
66 Pulmonary Tuberculosis; Its Nervous Manifestations. C. S. Kenney, Norton.—p. 217.

Maine Medical Association Journal, Portland

September, 1918, **9**, No. 2

67 Health Insurance. F. E. Rowe, Augusta.—p. 33.

Medical Record, New York

Sept. 21, 1918, **94**, No. 12

68 Treatment of Inoperable Cancer of Breast by Chemical Extirpation. (Phenol and Potassium Hydrate). C. W. Strobell, New York.—p. 487.
69 Common Deformities and Disabilities of Foot. J. Grossman, New York.—p. 492.
70 Results of Schick Test for Diphtheria Susceptibility on Five Hundred Selected Cases. C. A. Johnson, Los Angeles.—p. 498.
71 Control of Hemorrhage in Vaginal Hysterectomy. H. Crutcher, Tularosa, N. M.—p. 501.

New York Medical Journal

Sept. 21, 1918, **108**, No. 12

72 General Diagnostic Study by Internist. L. F. Barker, Baltimore.—p. 489.
73 Locomotion as Aid in Diagnosis. P. Luttinger, New York.—p. 494.
74 Technic of Intravenous Medication. F. Herb, Chicago.—p. 498.
75 Animal Powers not Mendelian Characters. C. L. Redfield, Chicago.—p. 499.
76 Appendicitis in Children. J. O. Bower, Philadelphia.—p. 501.
77 Mucous Colitis. R. Upham, New York.—p. 503.
78 Mobilizing Spas and Health Resorts of Nation. N. P. Norman, Fort Leavenworth, Kan.—p. 507.

Pennsylvania Medical Journal, Athens

September, 1918, **21**, No. 12

79 *Food Anaphylaxis and Methods of Making Tests. A. Strickler, Philadelphia.—p. 737.
80 Acute Suppuration of Middle Ear. J. C. Keeler, Philadelphia.—p. 743.
81 Laryngeal Tuberculosis. C. S. Rebuck, Harrisburg.—p. 747.
82 Herpes Zoster Ophthalmicus. J. F. Klinedinst, York.—p. 752.
83 Cooperation in Treatment. J. M. Taylor, Philadelphia.—p. 755.

79. **Food Anaphylaxis and Methods of Making Tests.**—There are two accepted methods of conducting the anaphylactic food tests. (1) The endermic and (2) the intradermic. Strickler prefers the intradermic method which consists in the introduction of a solution of a food protein in the layers of the skin by means of a hypodermic needle. As a result of this procedure a white wheal is produced at the point of injection and often there is a reddened zone around the blanched spot. This is conceded to be the most delicate method which can be employed in conducting the endermic skin test. The amount injected in this method is 0.1 c.c. In none of Strickler's cases were there any evidences of a constitutional reaction of any nature whatever. He adopted the following standard as to what constituted a positive reaction. (1) A papule must be present at the point of injection. (2) In the vast majority of cases a zone of erythema is found around the papule. (3) Tenderness is often found at the point of injection. (4) The lesion must persist for more than twenty-four hours after the injection. Wait for forty-eight hours before reading the reaction. Strickler studied fifty-four patients with eczema and the great majority of them were kept under observation for some weeks. The following proteins were employed: cow casein, egg, beef, mutton, pork, chicken, fish, oysters, clams, crabs, wheat, oatmeal, rice, barley, tomato, and strawberries. The protein is extracted by the use of weak alkali, and after shaking and incubating the solution it is filtered, absolute alcohol is added, and the solution evaporated on a water bath. A saturated solution of this dry material is made in an alkalinized sodium chlorid solution. These preparations were tested for sterility, and for their nitrogen contents by the Kjeldahl method. Twenty-eight patients were in a greater or lesser degree benefited by a changed diet, as shown by the anaphylactic food test. In thirteen cases the food tests were entirely negative, and in the remainder the correction of diet, as shown by the food tests, did not have any influence on the disease. Of thirteen patients with urticaria, eleven showed positive anaphylactic food reactions, while two were entirely negative. In this series five were acute and the remaining eight were chronic cases. In the acute cases the removal of the offending article caused a rapid subsidence of the eruption, and these tests serve as a guide to ward off further attacks. Of eleven patients suffering with psoriasis, four gave positive reaction and seven were entirely negative. Only in one case was there some improvement in the eruption following the installation of corrected diet. Strickler studied sixteen patients suffering with acne vulgaris and three with

acne rosacea. Five showed negative, the remainder positive reactions. In none of the cases, although most of them were kept under prolonged observation, did any noticeable improvement follow the corrected diet.

Southern Medical Journal, Birmingham, Ala

September, 1918, **11**, No. 9

84 *Oral Sepsis and Cardiovascular System. A. G. Brown, Richmond, Va.—p. 601.
85 *Relation of Oral Sepsis to Nervous System. E. B. Block, Atlanta, Ga.—p. 606.
86 Venereal Disease: Vital Social, Medical and Military Problem. H. Schoenrich, Baltimore.—p. 616.
87 *Normal College as Factor in Dissemination of Public Health Knowledge in South. M. F. Jones, Hattiesburg, Miss.—p. 624.
88 Some Unsettled Points in Surgical Treatment of Cholangitis and Cholecystitis. J. Darrington, Yazoo City, Miss.—p. 631.
89 Surgery of Gallbladder. J. R. Wathen, Louisville, Ky.—p. 633.
90 Indications for Removal of Gallbladder. W. C. Gewin, Birmingham.—p. 635.
91 Fracture of Hyoid Bone. J. T. Crebbin, New Orleans.—p. 642.
92 Mastoiditis Complicated by Unsuspected Lateral Sinus Thrombosis.—R. W. Bledsoe, Covington, Ky.—p. 643.

84, 85 and 87. Abstracted in THE JOURNAL, Dec. 29, 1917, p. 2207.

FOREIGN

Titles marked with an asterisk (*) are abstracted below. Single case reports and trials of new drugs are usually omitted.

Brain, London

June, 1918, **41**, No. 1

1 Interdependence of Sympathetic and Central Nervous Systems. D. Orr and R. G. Rows.—p. 1.
2 Conduction in Peripheral Nerve and in Central Nervous System. E. D. Adrian.—p. 23.
3 Stimulation of Motor Cortex in Monkey Subject to Epileptiform Seizures. C. S. Sherrington.—p. 48.
4 Intracranial Aneurysms. H. M. Turnbull.—p. 50.

British Medical Journal, London

Aug. 24, 1918, **2**, No. 3008

5 Education and Brain Development. W. A. Hollis.—p. 179.
6 Restoration of Function After Penetrating Gunshot Wounds of Knee Joint. J. Everidge and A. Fullerton.—p. 182.
7 *Treatment of Septic Wounds. F. W. Robinson.—p. 184.
8 Bed and Some Appliances for Gunshot Wounds of Femur and Back. M. G. Pearson.—p. 186.
9 Case of Septicemic Meningitis; Recovery. J. Dunbar.—p. 187.

Aug. 31, 1918, **2**, No. 3009

10 Educational Number, 1918-1919.—p. 209.

7. **Treatment of Septic Wounds.**—Robinson describes a method of keeping wounds elevated as well as compressed. He says that it allows of a complete toilet. The bactericidal serum enhances the defensive properties of a wound, which, as is well known, are at a high state of development at the time of infection. During the progress of healing the perfect immobility of the compressed area, since all circumferential forces are inhibited at the line of constriction, gives the best condition possible for the building up of healthy scar tissue. The part inside of the constricted area is free from any kind of traction, and the edges of the wound are quite flaccid and tend to fall together.

Of equal importance in the healing process is an avoidance of anything that would tend to depreciate the vitality of the growing cells. The practice of packing a wound with an unabsorbable dressing, such as sterilized gauze, is a familiar example of the continued disturbance of growing granulations wherever such a dressing is removed; not only is the proceeding exceedingly painful, but a layer of germinal tissue is taken away in the dressing to which it has adhered. This, of course, means delay, and what causes delay will eventually show in the final cicatrix. It is urged, too, that germicides in destroying bacteria must in some measure impair the vitality of the surrounding cells; it is considered improbable that the bacterial protoplasm should be killed outright, and that the protoplasm of the neighboring cells should escape untouched.

Many years ago Robinson invented a dressing from cancellous tissue of bone. This is deprived of fats, decalcified and bleached, and forms a soft white sponge-like tissue which adapts itself readily to the soft parts. It is both absorbent and absorbable. Though its utility has been circumscribed and limited, it is still a most serviceable dressing for chronic wounds. It fails in freely secreting wounds, as it does not provide sufficiently for drainage. Robinson thinks that if modified the matrix of bone tissue will ultimately form a basis for dressings.

Bulletin of Canadian Army Medical Corps, Ottawa

August, 1918, **1**, No. 5

11 Enemy Air Raids on Canadian Hospitals, May, 1918. J. G. Adami.—p. 64.
12 *Diagnosis of Chronic Infections with Gonococcus by Complement Fixation Test. F. B. Bowman and P. D. Saylor.—p. 73.

12. **Complement Fixation Test in Diagnosis of Chronic Gonorrhea.**—The specificity of the complement fixation test for gonorrhea is confirmed by Bowman and Saylor. They state that in cases in which a large amount of pus is present and intracellular gram-negative cocci are numerous, a diagnosis of gonorrhea can be accepted. But in cases in which there is no discharge, or very little, with very few bacteria present, a positive diagnosis of gonorrhea cannot be given. Three hundred and eighty-three tests have been made. Of these, 177 were positive; 77 patients gave a definite history of having had gonorrhea, and 60 of these were strongly positive and 17 negative. Of 36 cases diagnosed as epididymitis, 19 were positive, 17 were negative; of 20 cases diagnosed as prostatitis, 14 were positive, 6 were negative; of 21 cases of orchitis, 15 were positive, 6 were negative; of 4 cases of chronic gleet, 3 were positive and 1 negative; 3 cases diagnosed as rheumatic fever were positive; of 26 cases with a clinical diagnosis of myalgia and no clinical evidence of gonorrhea, 8 were positive and 18 negative. A Wassermann test was made on each of these specimens; 25 were positive, and all of these had had syphilis, or clinical evidence of this disease was actually present. The authors found no evidence of cross fixation in this series of tests. The gonorrheal test is never positive in localized anterior urethritis, nor is it usually positive before the sixth week of the disease if no complications are present. A patient should not be considered cured if the test is still positive, even two months after the disappearance of all symptoms.

Indian Medical Gazette, Calcutta

July, 1918, **53**, No. 7

13 *Treatment of Malaria. R. Ross.—p. 241.
14 *Quinin Prophylaxis in Malaria. L. Rogers.—p. 249.
15 Treatment of Malaria by Quinin: Failure of Splenox. E. H. Wright.—p. 252.
16 Quinin in Malaria Prophylaxis. K. D. Pringle.—p. 258.

13. **Treatment of Malaria.**—From the results of treating 1,040 old cases of malaria with antirelapse quinin prophylaxis, it would appear that comparatively small doses, amounting to about 60 grains a week, distributed in various ways, reduce relapses to about 10 per cent. of the cases per month, and also diminish the severity of the relapses when they do occur. But 5 grains daily seem less effective and 15 grains daily are no more effective than 10 grains daily and less well borne by the patients. Ross has not been able to note any marked superiority in any one of the three modes of administration of quinin—oral, intramuscular or intravenous—as regards either the speedy reduction of the fever and the parasites (in relapses), or as regards complete sterilization of cases. Harrison's method of using oral and intramuscular administration together is valuable when large dosage is employed. Several medical officers favor complete rest in bed during treatment, even for two or three weeks, especially when large doses of quinin are being given. Generous diet and a little beer or wine are usually given. Arsenic and iron are also favored for the later stages of treatment, but it has not been possible as yet to obtain decisive statistical evidence in support of any of these views. Out of the total of 2,460 cases studied here, 682 or 27.7 per cent. are known to have relapsed either during treatment or afterward.

14. **Quinin Prophylaxis in Malaria.**—Rogers believes that in places where the great majority of the inhabitants are already infected with malaria, as shown by a very high endemic index, quinin prophylaxis has little scope except in the case of European and other immigrants, among whom it

is of the utmost importance, but for the general population full curative treatments with quinin, preferably once a quarter, are necessary materially to reduce malaria.

Quinin prophylaxis to be successful should be based on the following principles: (*a*) A sufficient dose should be given to kill all the invading parasites, so as to avoid the danger of any quinin resisting form surviving and making the fever more difficult to cure. For this purpose not less than 10-grain doses are indicated. (*b*) The intervals between the doses should not exceed two days less than the mean incubation period of the most rapidly developing form of malaria present, which will almost invariably be the malignant tertian variety with a mean incubation period of six days and a minimum of two days. The interval should therefore not be less than four days, and if an epidemic is present this should be reduced to two days. (*c*) The prophylactic doses should be given on two consecutive days as a rule so as to act on the stage most amenable to quinin of each brood of a double infection.

The causes of the frequently reported failures of the two most commonly employed methods are: (*a*) in the case of Koch's biweekly doses on two consecutive days with a five-day interval, that the interval is too long in the case of malignant tertian malaria, especially when of a virulent form; (*b*) in the case of daily 5-grain doses, that the dose is too small to be certain to destroy all the parasites. To be effective as a prophylactic against malaria, quinin should be given in not less than 10-grain doses on two consecutive days, with an interval of not more than four days without the drug, and in highly malarious places the interval should be reduced to two days and the dose increased to 15 grains. Ten grains every other day has also proved successful.

Lancet, London

Aug. 24, 1918, **2**, No. 4956

17 Celiac Disease. G. F. Still.—p. 227.
18 *Treatment of Wounds. J. T. Morrison, J. N. J. Hartley and E. F. Bashford.—p. 230.
19 Postdiphtheritic Paralysis Following Cutaneous Diphtheria. F. M. R. Walshe.—p. 232.
20 Treatment of Staphylococcal Infections by Stannoxyl. A. Compton.—p. 234.
21 *Blood Pressure Measurements: Uses and Limitations in Modern Medicine. E. S. Kilgore.—p. 236.
32 Five Cases of Rapid Death in Young Men. A. Abrahams and N. F. Hallows.—p. 239.

Aug. 31, 1918, **2**, No. 4957

23 Students' Number, 1918-1919.—p. 259.

18. **Treatment of Wounds.**—The Carrel-Dakin treatment of wounds is strongly endorsed by Morrison and his associates. Two hundred cases form the basis of this paper. The first 100 were patients treated in a base hospital in the wards devoted to the most serious cases; the second 100 in the surgical observation hut attached to a general hospital. These last consist of severely wounded men, moribund cases being excluded. Results vary greatly according to whether preliminary surgical treatment is undertaken in the preinflammatory period or after sepsis is established. The cases are therefore divided into (*A*) those patients operated on within twenty-four hours, and (*B*) those without preliminary operative cleansing, or in which this was not done till at least twenty-four hours had elapsed. Far better results were obtained in the Class A cases than in the Class B cases. This method of wound treatment is compared with other popular methods now in use greatly to their disadvantage. The proportion of really successful cases (that is, where secondary suture in the first ten to twelve days permits practically of a return to normal) is higher far than that attained under any other treatment thus far tested. The only other method giving results at all comparable is that of early operation and primary suture with or without the use of brilliant green, bipp, flavine, soap, or other fashionable adjuvants.

The authors conclude their report by saying that the dichloramin-T oil method of wound treatment is simple of application, and the claim that the action of a single application is prolonged is substantiated. The results, even when judged by modern standards, are not to be disregarded. Dichloramin-T oil is not indifferent to granulation tissue or to the skin edges of wounds, but has, especially if used for a long time, a deleterious action on both. The ingrowth of skin is retarded, and the natural tendency for granulation tissue to disorganization is aggravated. The use of an oily menstruum does not altogether prevent the adhesion of dressings to the surface or obviate the repeated, if minute, insult to the tissues inseparable from each dressing. Though an improvement on some other methods in vogue, dichloramin-T oil has not yielded the improvement on neutral solution of chlorinated soda that was anticipated, perhaps because it is neither innocuous to healthy granulation tissue, nor a solvent of dead tissue; perhaps, possibly, because an oily application is not so efficacious as a watery solution in the treatment of wounds.

21. **Blood Pressure Measurements.**—Experience has shown great practical clinical value of blood pressure measurements in connection with a limited number of conditions, namely, arterial and renal diseases, cerebral pressure, pregnancy toxemias, Addison's disease, and, to less extent, aortic insufficiency. Before attributing pathologic significance to the measurements, however, Kilgore says, wider normal limits (both systolic and diastolic) should be recognized than those generally indicated in the books. Figures from normal young adults are presented in substantiation of this statement. An important and little known application of the blood pressure apparatus is its use in the detection of pulsus alternans. It is urged that systolic pressure be retained as the most important measurement, and that the simple palpatory technic be used. Blood pressure determinations in general have fallen short as clinical indicators of circulatory function. Pulse pressure, and consequently the various formulas in which it is involved, depends on too many factors to be a very useful index for any of them. Great variation is shown among pulse pressure measurements of normal persons. The same criticism is shown to be applicable in the case of the auscultatory tone phases.

Archives Médicales Belges, Paris

August, 1918, **71**, No. 8

24 *Tropical Diseases in the Balkans. A. Castellini.—p. 145.
25 *Tuberculous Otitis Media. F. Tits.—p. 168.
26 Treatment of Tuberculous Adenitis. L. Lecrenier.—p. 176.
27 Work in Treatment of Tuberculosis. Faniel.—p. 183.
28 Tenotomy and Flail Joints. A de Marneffe.—p. 191.
29 Present Status of Lobar Pneumonia. Van Reeth.—p. 195.

24. **Malaria and Other Tropical Diseases in the Balkans.**—Castellani comments on the wide variety of clinical pictures presented by malaria in the Balkans. This is puzzling for medical men not familiar with tropical diseases. There is no internal disease that malaria may not simulate, and it may even induce a set of symptoms deceptively suggesting acute surgical affections. He reviews his experience and relates typical cases of each type, including pseudopurpura, sleeping sickness, cholera, cirrhosis, appendicitis, cholecystitis and pancreatitis—for all of which malaria was responsible, as also in 90 per cent. of some epidemics of alleged typhus. Among diseases other than malaria, trench foot has been encountered, like that in France, spirochete bronchitis and jaundice. Dysentery, typhoid and tropical skin diseases are common, as also pellagra in certain parts of Macedonia.

25. **Tuberculosis of the Middle Ear.**—The young soldier had been at the front for two years, apparently healthy, when otitis media developed and proved to be of tuberculous origin, secondary to an unsuspected lesion in the lung. Tits is convinced that tuberculosis would be found responsible for otitis media in a larger proportion of cases if it were suspected in the torpid chronic cases that have no acute onset. He warns further that examination may give negative findings as in this case. Only when the examination was repeated several times were the results conclusive.

Bulletin de l'Académie de Médecine de Paris

Sept. 3, 1918, **80**, No. 35

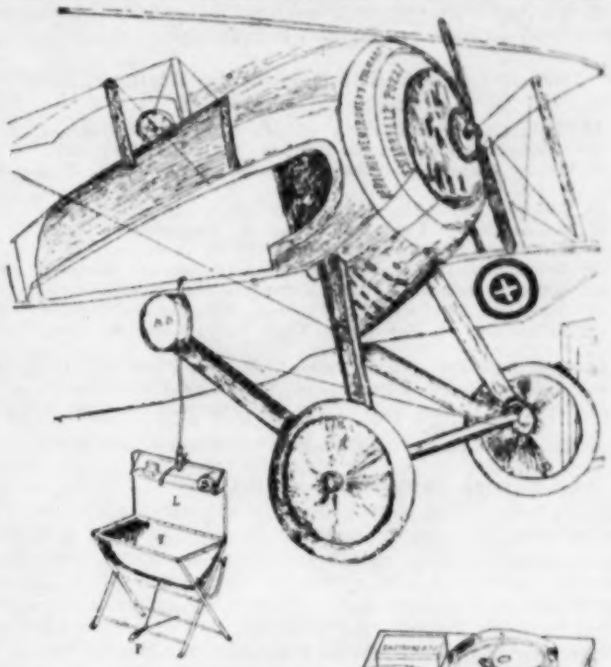
30 *Comparative Resonance of Tuberculous Apex. E. Boinet.—p. 196.
31 *Mumps. L. Captan.—p. 197.
32 *Aeroplane Surgical Unit. A. Nemirovsky and Tilmant.—p. 202.
33 *Syphilitic Peritonitis. M. Letulle.—p. 209.

30. **Resonance of the Apex.**—Boinet describes how percussion can be made most instructive to detect changes in the resonance and transsonance of the apexes.

31. **Mumps.**—Capitan analyzes his experiences with 700 cases of mumps in the troops. Careful bacteriologic examinations demonstrated, he says, that mumps is a polymicrobian infection of the blood. In some of the cases lymph nodes below the salivary glands became swollen and even suppurated, and bronchitis up to pneumonia was also occasionally encountered as part of the clinical picture. The spleen was almost invariably enlarged. Orchitis was observed in 16 and 15 per cent. of the cases before 1918, but during this year the proportion has been 25 per cent. The disease has been a little graver on the whole this year, and the complications more frequent. In some rare cases there was a rubeola-like eruption, and in six cases meningeal symptoms developed, relieved by lumbar puncture. All these complications of mumps proved mild. The early hypertrophy of the spleen may aid in the differential diagnosis.

32. **Aeroplane Surgical Unit.**—As mentioned in the Paris Letter, page 1155, a flying surgical unit has been devised by Nemirovsky and Tilmant. The specifications were filed with the Ministère des Inventions, Feb. 21, 1918. The success of the aeroplanes devised to carry the wounded to the surgeon soon suggested the advantages of conveying the surgeon to the wounded, and this "aerochir" is the result. It aims to bring to the first aid stations, to advanced posts without roentgen equipment, a well equipped surgical and roentgen outfit, and aid advanced posts overwhelmed by the influx of wounded beyond what they had been organized for.

The aerochir is designed to carry, besides the pilot, a surgeon and a radiologist to serve as assistant to the surgeon, and all the roentgen and surgical material for all kinds of interventions. The motor of the plane can supply the power for the roentgen current with the interposition of a small transformer and interrupter. It can serve also for electric sterilization, or a storage battery can be utilized for this. The apparatus are light and portable so that they can be readily carried into a first aid post or other surgical station and set to work at once, or they can be used in connection with the aerochir itself. The apparatus are not described in detail, but the advantages of a flying radiosurgical unit, alone or in squadrons, are emphasized, especially the rapidity with which surgical aid can be brought, the fact that the roads are left free just at the time when they are liable to be most clogged, the speed of transit and the fact that the wounded is spared the transportation, having aid brought to him in the swiftest and most complete manner. In urgent periods the aeroplane could return to headquarters for a new outfit, so that one or two of these aerochirs could serve for 200 kilometers of the fighting front and no spot would be more than two hours away when summoned by telephone. The radioscopic and radiologic manipulations not requiring the patient to be undressed could be done in the aeroplane itself. With the cap devised by Dr. Mondain to be used with Nemirovsky's compass, the projectiles can be located in full daylight. This compass as well as any surgical instrument needed can be placed in the aeroplane without cumbering it.



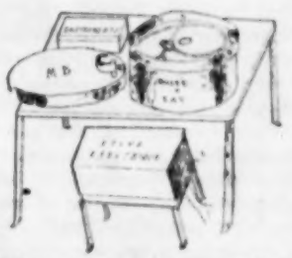


Fig. 2.—Folding washstand, instrument stand and electric sterilizer.

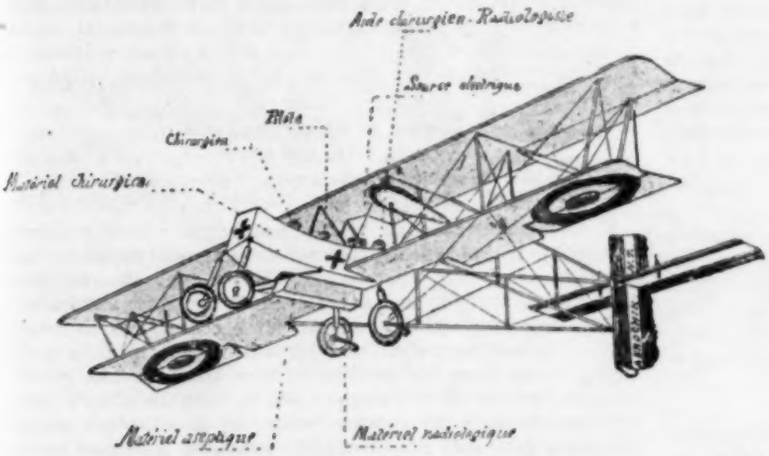


Fig. 1.—Roentgen-surgical aeroplane "Aerochir."

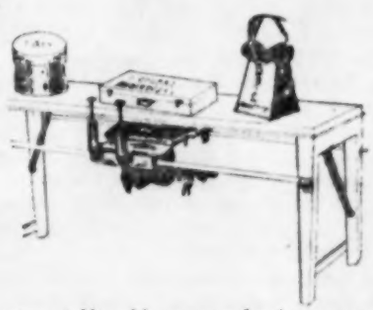


Fig. 3.—Roentgen table with compass for locating projectiles.

33. **Syphilitic Peritonitis.**—Letulle devotes twenty-one pages to this preliminary communication on the frequency of syphilis as a factor in the development of ascites with cirrhosis of the liver. In a recent series of 152 cases of cirrhosis of the liver he found the Wassermann test positive in about 49 per cent. of the cases. His research has further demonstrated that the peritoneum is frequently the favorite culture soil for the syphilis spirochete. Syphilitic peritonitis is usually secondary to some inflammation of the liver, either a syphilitic affection of the liver or simple diffuse cirrhosis hitherto erroneously ascribed exclusively to abuse of alcohol. This secondary syphilitic peritonitis may extend throughout the whole peritoneum, but as a rule it is partial, circumscribed in special regions, around the liver, cecum, colon, etc. Whatever the extent of the lesions and their microscopic texture, this specific seritis, as he calls it, long respects the structural integrity of the organs which it covers with its fibroid shell, but finally they may become involved in its cicatricial retractions. These retractions and the consecutive atrophy at points of the peritoneum may entail redoubtable complications, and

their true nature and the outlook should be understood in the study of abdominal pathology. He gives illustrations of some typical findings; the chronically inflamed serosa throws up a hypertrophic sclerosis, and from this exudes the progressive ascitic effusion so familiar to the clinic.

Bulletins de la Société Médicale des Hôpitaux, Paris

May 24, 1918, **42**, No. 18

34 *Lethargic Encephalitis. A. Chauffard and M. Bernard.—p. 470; Histologic Findings. P. Marie and C. Trétiakoff.—p. 475.
35 *Tardy Relapse of Meningitis. E. de Massary and L. Tockmann. —p. 480.
36 Malarial Meningitis. G. Paisseau and J. Hutinel.—p. 484.
37 *Eosinophilia in Pleural Effusions. M. Petzetakis.—p. 487.
38 *Cholesterol in Joints. M. Loeper and G. Verpy.—p. 496.
39 Transient Exophthalmic Goiter After Typhoid. G. Faroy.—p. 499.
40 *Icterohemorrhagic Spirochetosis. Costa and Troisier.—p. 502.
41 Peripheral Paralysis After Typhoid. Cestan and Others.—p. 506.
42 Polyneuritis or Hemiplegia After Paratyphoid. R. Cestan and Others.—p. 508.
43 Hemiplegia Complicating Typhoid. R. Cestan and Others.—p. 510.
44 *Hemolytic Index of Serums. de Verbizier and Marchand.—p. 512.
45 *Valvular Disease and Fitness for Service. A. Clerc and H. Aimé.—p. 516.
46 *Intraspinal Lavage in Meningitis. G. Rosenthal.—p. 521.

34. **Lethargic Encephalitis.**—In the first of the two cases reported the young woman died the ninth day after the first symptoms, diplopia, slight headache, with complete bilateral ptosis the third day, with increasing somnolency. The other young woman was four months pregnant, and the symptoms at first were profound apathy, immobility of the facial muscles, catatonic retention of attitudes, and torpor to such an extent that she seemed to be constantly asleep with the eyes open, but there were no ocular symptoms. There was a slight rise in temperature the sixth week and the woman died at the end of the seventh week. In the discussion, Netter emphasized the differences between this lethargic encephalitis and poliomyelitis, and stated that the British have already reported 105 cases. Marie described the histologic findings in the above two cases. To the naked eye the brain seemed normal, but the microscope revealed in both a small focus of subacute inflammation in the locus niger (substantia nigra or intercalatum), spreading toward the ganglions of the base and to the gray matter close to the ventricle in the protuberance and the bulb. The lesion was strictly limited to the juxtaventricular gray matter, the nuclei around being apparently sound.

35. **Tardy Relapse of Meningitis.**—The relapse occurred four months after defervescence, but the man had not felt well in the interim. The relapse occurred after antityphoid inoculation, and the case suggests that men who have had meningitis should be spared the antityphoid inoculations. During his convalescence he presented the symptoms and aspect of general paresis, and recovery was very slow. He was finally discharged as unfit for duty.

37. **Pleural Effusions.**—Petzetakis explains that the eosinophils and basophils found in an aseptic pleural effusion are formed on the spot at the expense of the polynuclears, etc., of the effusion. He calls this *eosinoplassic*.

38. **Cholesterol Deposits in Joints.**—Loeper and Verpy found deposits of cholesterol crystals in the connective tissue, synovia, and in the synovial fluid in a man of 47 with deforming polyarthritis of the fingers and wrist who had succumbed to aortitis. There were also similar deposits in the aorta. Cholesterol deposits were also found in a soft tumor from a woman of 39 with old and extensive deforming rheumatism. In a third case the man had gouty tophi in addition to the deforming rheumatism. In a hygroma removed from the shoulder, there was an enormous proportion of cholesterol crystals with uric acid crystals. They add that to determine the nature of a deforming rheumatism it may be necessary to apply chemical tests to the deposits in the joints. Treatment would vary then according as the tests reveal, singly or combined, carbonophosphates, oxalates, uric acid or cholesterol.

40. **Icterohemorrhagic Spirochetosis.**—Two more cases are reported of the meningeal form with subjaundice, with complete recovery.

44. **Hemolytic Index.**—De Verbizier and Marchand discuss the hemolytic index of human serums in connection with the "rapid" technic for the serodiagnosis of syphilis. Their research in 300 cases has confirmed the conclusions of Hecht-Weinberg in respect to the necessity for ascertaining the hemolytic index as a preliminary to the test.

45. **Valvular Disease and Fitness for Service.**—Clerc and Aimé comment with approval on the recent regulations which specify that men with valvular disease should be dismissed from the army temporarily or permanently as the commanders are unable to maintain a stable system for sedentary limited service. Occasionally this may deprive the army of the services of some man who might have stood the strain, but the army as a whole has only gained by it. In the present condition of things it is better to renounce a few than to expose the large number of men with valvular disease to the nefarious consequences of the strain of army life.

46. **Intraspinal Lavage.**—Rosenthal reports a case of cerebrospinal meningitis with the *Meningococcus crassus* which confirms the advantages of rinsing out the spinal cavity with saline and citrate solution. The solution is introduced until it comes away clear, first the 38 per cent. solution of sodium citrate; then simple saline; then the chlorocitrate solution: 7 gm. of sodium chlorid and 8 gm. of sodium citrate to the liter. A very fine needle is introduced inside the ordinary lumbar puncture needle, thus ensuring the two-way current. In the case described, the thirty-first lumbar puncture showed normal spinal fluid, confirming the clinical recovery, over two months after the first symptoms. Disinfection of the nasal fossae formed part of the treatment. The disease had run its course in waves.

The spinal cavity is rinsed out with the simple saline, introducing it 20 c.c. at a time. With patience, up to 100 or even 160 c.c. can thus be used to flush the spinal cavity, using the chlorocitrate solution only for the last two syringefuls. Sodium citrate checks the production of false membranes, and a little of the chlorocitrate solution is left in the spinal cavity at last to facilitate this action. The strong citrate solution is liable to cause transient pain, and hence should be rinsed out carefully.

Journal de Chirurgie, Paris

July, 1918, **14**, No. 6

47 *Cicatricial Stenosis of Esophagus. L. Sencert.—p. 553.
48 Resection of Left Angle of Colon for Cancer. Desmarest.—p. 575.

47. **Cicatricial Stenosis of the Esophagus.**—Sencert refers to absolutely impassable stenosis or stenosis which is not constantly and easily permeable. The simple, effectual and certain treatment for such cases, he declares, is a gastrostomy with retrograde "endless" dilatation. He describes in detail how to overcome the difficulties encountered in this, with typical cases from his total experience with fourteen cases. One illustration shows the cardia as seen by direct gastroscopy through the gastrostomy opening. Another shows the young man with the thread left emerging from this opening and through the mouth.

Lyon Médical

July, 1918, **127**, No. 7

49 Case of Atypical Tetanus. Roubier.—p. 289.
50 Variola at Lyons in 1917. Bonnamour.—p. 299.
51 Low Blood Pressure and Tachycardia in the Gassed. Piéry.—p. 321.

Paris Médical

July 13, 1918, **8**, No. 28

52 Abdominal Pain with Chronic Amebiasis. E. Deglos.—p. 33.
53 *Shock. G. Blechmann.—p. 38.
54 *Autogenous Vaccine for Brain Wounds. A. Moulonguet.—p. 41.
55 Recording Register for Joint Function. Dausset.—p. 44.

July 20, 1918, **8**, No. 29

56 *War Wound of Knee. Monprofit and L. Courty.—p. 49.
57 *Treatment of Psychoses with Convulsions. G. Aymes.—p. 56.

53. **Shock.**—In order to get a better idea of the nature of shock, Blechmann has had each case investigated and the data recorded on a systematic plan. The chart listed each of the seven reflexes tested, the oscillometer maximal and minimal pulse, the oculocardiac reflex, the blood viscosity, coagulation and hemoglobin, lumbar puncture; white der-

mographism, etc.—over forty kinds of data from the examination being thus recorded on the chart by a uniform plan as the patient is being undressed, heated and morphinized. The oscillometer is particularly convenient for repeated determination of the blood pressure in the wounded, as it can be applied to wrist or ankle. On each chart is recorded also the clinical impressions of the phases through which the patient passes. These records have aided in establishing that the state of shock is not due to the hemorrhage or to any single cause but to the combination of the concussion, the pain, hemorrhage, etc., and superposed on these the anesthesia, the operative shock and toxi-infection. He adds that Crile's and Roger's researches have proved the Ariadne's thread that has led us at least to warm up the wounded and give some preoperative treatment, watching over the evolution of the shock by the behavior of the blood pressure.

54. **Autogenous Vaccine for Brain Wounds.**—The pulsation in the brain aids in the expulsion of small splinters and foreign bodies, but the brain has very little power of defense against infection. To enhance this by an autogenous vaccine specially prepared to act on brain tissue, Moulonguet took the microbes for it from the brain lesion itself, and added human or bovine brain tissue to the culture medium. The twenty-four hour culture was emulsioned in physiologic solution and heated to 60 C. for an hour. This brain autovaccine was then administered by subcutaneous daily injections. One culture tube provided three ampules, and he injected half an ampule the first two or three days and then a whole ampule after this. He has applied this treatment only in three cases to date, but the improvement was so marked under it, as he describes in detail, that he does not wait for further confirmation to commend this treatment as a prophylactic measure after an operation on the brain, to prevent the development of infection or aid in curing it if it has developed, especially in cases of subacute and chronic encephalitis, and after operative treatment of a tardy abscess in the brain developing around a splinter or projectile. He adds that this vaccine may render good service also after an operation on a brain abscess of otitic origin, or in preventing its development.

56. **Perforating Wounds of the Knee.**—Monprofit and Courty tell how during the first years of the war arthrotomy, even very extensive, gave such bad results with wounds of the knee that many of the men evacuated apparently in good condition had to be amputated in the reserve hospitals. Much better results were realized when, instead of opening up the joint widely, it was merely punctured to release the extravasated blood and effusion, or extract the projectile with the least possible injury to the tissues, and then sutured and immobilized. The synovial membrane does not stand well exposure to the air, and the joint heals far better when the synovialis is sutured at once with catgut and the skin with silk. When the bones are so injured that resection is necessary, it should be the typical resection. This averts amputation, drains well and gives good orthopedic results. In his 16 cases the cure was complete in 15, one man requiring amputation on account of tetanus. In Tuffier's 108 cases of resection the knee was firm with slight mobility in 11 cases, with complete ankylosis in 93; the joint was loose in 5 cases.

57. **Treatment of War Psychoses with Convulsions.**—Aymes has been impressed with the improvement under calcium chlorid associated with a hypnotic in treatment of war psychoses with convulsions. He describes the details of the twelve cases given this combined treatment.

Presse Médicale, Paris

Aug. 8, 1918, **26**, No. 45

58 *Daughter Echinococcus Cysts. F. Dévé.—p. 413.
59 *Sepsis from the Mouth. Dufourmentel and L. Frison.—p. 145.
60 Extension Treatment of Bones in Hand. Lance.—p. 416.

58. **Echinococcus Cysts.**—Dévé describes the origin of and the pathogenic conditions inducing daughter cysts, saying that so long as the mother cyst is in a quiescent state there is no production of daughter cysts until the mother cyst is growing very old or its contents become infected or stained with bile, or the fluid contents are evacuated. All of these causes become more likely with the increasing age of the cyst. It is important to ward off these different causes for production of daughter cysts, especially refraining from puncture. The cyst should be removed at the earliest possible moment, and we should seek for echinococcus cysts in dubious cases, even in children, as a routine measure. Many cases of cysts in adults date from childhood.

59. **Sepsis of Buccal Origin.**—The three cases reported proved fatal. In one there was a toxic cellulitis of the neck, and in one phlebitis of the craniofacial vessels. The primary lesion had been an acute gingivitis or abscess at the root of a tooth, and the resulting septicemia proved fatal in from two to eighteen days.

Progrès Médical, Paris

June 29, 1918, **33**, No. 26

61 *Cholesterol Deposits in Joints. Loper and Verpy.—p. 221.
62 *Soldiers' Irritable Heart. A. Clerc and H. Aimé.—p. 222.

July 6, 1918, **33**, No. 27

63 *Retarded Primary Suture of War Wounds. A. Chalier.—p. 229.
64 *Traumatic Lesions of the Arteries. G. Jeanneney.—p. 230.

61. Summarized in abstract 38.

62. **Soldiers' Irritable Heart.**—Clerc and Aimé discuss recent literature on this subject. A hyperexcitability of the entire sympathetic system seems to be the actual cause of the irritable heart and the instability of the circulation and secretory processes which generally accompanies it. A constitutional predisposition or the effect of some infection is the primary factor.

63. **Primary Suture of War Wounds.**—Chalier insists that it is possible to apply the primary suture even as late as twelve hours after the wound when clinical observation shows that the wound is little if any infected. In 32 cases he operated and sutured between the thirty-fifth and fortieth hour in 3; to the forty-eighth hour in 9; third day in 7; and from the fourth to the eleventh day in 13. In only 3 of the total 32 was it necessary to open up the wound again. In all the others the scar was linear and supple as with the finest early sutures. A number of the men returned to the front in less than a month, and yet the wounds had been serious ones, some including the skull, others large arteries; in 17 cases projectiles had to be extracted.

64. **Traumatic Lesions of Arteries.**—Jeanneney expatiates on the convenience and advantages of the Pachon oscillometer as a means to estimate the blood pressure and the diagnosis and prognosis of war wounds of arteries. Some lesion of the artery may be assumed when the oscillometric curve is lower and shorter than on the sound side. It shows whether the circulation below a ligature is growing better or worse, and thus is a guide to treatment and for the prognosis. Besides its practical value along these lines, it throws light on the vasomotor mechanism of the phenomena accompanying vascular lesions.

Correspondenz-Blatt für Schweizer Aerzte, Basel

Aug. 17, 1918, **48**, No. 33

65 *Paroxysmal Tachycardia. O. Roth.—p. 1089.
66 The Physiologic Concomitant Reflexes. A. Rodella.—p. 1102.
67 Personal Prophylaxis of Diphtheria. F. Brandenberg.—p. 1106.
68 *Influenza. E. Lanz.—p. 1108.

65. **Paroxysmal Tachycardia.**—Roth describes five cases of sinus tachycardia, and says that in all he was able to arrest the attack of tachycardia by applying mechanical irritation to the vagus nerve. The simplest method for the purpose was found to be compression of the cervical portion of the vagus nerve. To ward off recurrences he gave small doses of a preparation of digitalis three times a day.

68. **Influenza.**—Lanz comments on the frequency of pneumonia in the present epidemic of grip. The rusty sputum of pneumonia and a crisis are seldom observed, but reduction of the chlorids in the urine and their return to normal at once when the process is arrested are reliable bases for diagnosis and prognosis. No benefit was derived from acetylsalicylic acid, optochin or salvarsan, but a mixture of digitalis, sodium salicylate and antipyrin salicylate every two hours seemed to check the spread of the pneumonia process by the intense

sweating induced and the toning up of the heart. He has had no further deaths since this treatment was instituted. No handkerchiefs are allowed, toilet paper being used for the nose and sputum; other prophylactic measures include gargling and inhalation of turpentine fumes.

Annali di Ostetricia e Ginecologia, Milan

March, 1917, **19**, No. 3. Pub'd September

69 *Thermo-Precipitin Diagnosis of Tuberculosis. A. Fornero.—p. 87.
70 *Radium Therapy for Uterine Cancer. Ponzio and Maiolo.—p. 99.

69. **Thermo-Precipitin Diagnosis of Tuberculosis.**—Fornero has been applying this test in his obstetric and gynecologic cases and has found it simple and reliable. Civalleri first called attention to the zonal reaction of precipitation when an extract of tuberculous sputum, obtained with chloroform, is brought into contact with antituberculosis serum. Fagiuoli obtained precipitation with immune tuberculosis serum, but Fornero's method is more reliable. He makes an emulsion of the sputum with physiologic solution, equal volumes, and after boiling and filtering, places it in contact with tuberculosis immune serum. The resulting precipitation reaction does not occur with normal or syphilitic serums. This technic renders the reaction more specific than without the heating. The immune serum found most striking in its effects came from an ass hyperimmunized with killed and live human tubercle bacilli. Fornero pours on 2 c.c. of the sputum twice the amount of chloroform and keeps it at 37 C. for about three hours. The chloroform is then decanted and four parts of physiologic solution are added to what is left in the tube. The whole is agitated and the resulting emulsion is boiled in the water bath for two minutes. Then it is filtered cold through a No. 590 Schleisser and Schull paper. A tube about 5 cm. tall by 6 mm. in diameter is filled half full with physiologic solution, and a layer of the filtrate is poured on the top from a pipet. The reaction reaches its height in fifteen or twenty minutes. He obtained positive results in 94 per cent. of all certain cases of tuberculosis and only in 7 per cent. of the nontuberculous. The test can be applied likewise to urine or pus, to placenta extract, etc. The test can be applied equally well with a much smaller amount, not to waste the immune serum, keeping the same proportions. Fornero's experience confirms the reliability of this technic, as he describes at length. In military barracks he has obtained positive reactions in some cases when no tubercle bacilli could be found in the sputum. This test was not considered sufficient basis for accepting the diagnosis of tuberculosis, but within three weeks tubercle bacilli appeared in the sputum.

70. **Radium Treatment of Uterine Cancer.**—The experiences with 50 cases of inoperable or recurring uterine cancer are reported in detail. In the 42 cases with an interval since of one to three years, 16 seem to be both clinically and anatomically cured, and in 14 cases the tumor has been arrested and retrogressed.

Gazzetta degli Ospedali e delle Cliniche, Milan

June 16, 1918, **39**, No. 48

71 Liver Abscess and Amebic Dysentery. F. Dagasso.—p. 477.
72 Chloroform Not Effectual Against Tapeworms. Borino.—p. 484.

June 20, 1918, **39**, No. 49

73 Tuberculin Treatment of Nodose Erythema. Matteucci.—p. 485.

June 23, 1918, **39**, No. 50

74 Evaluation of Disability after War Wounds. Marangoni.—p. 496.

Riforma Medica, Naples

July 20, 1918, **34**, No. 29

75 *The Soldier's Ration and Physiology. F. Rho.—p. 561.
76 *Chronic Cardiovascular Disease. P. Marfori.—p. 567.
77 The Recent Pandemic. U. Gabbi.—p. 572.
78 Hygiene for Aviators. D. Tanturri.—p. 574.
79 Scabies. D. Barduzzi.—p. 575.

75. **The Soldier's Ration.**—Rho is the medical chief of the Italian navy, and he here discusses the physiologic bases for a well balanced ration. He replies to Bottazzi's arguments (summarized recently, page 692), and cites the experiences in other countries. He remarks that the men in the Italian navy average 60 kg. in weight (about 132 pounds). On destroyers and other small vessels there is often no settled ration, and the men eat to suit their taste. When this is the case, investigation has shown that they do not take over 2,700 or 2,800 calories, and are content with 90 or 96 gm. of protein. Recent research has shown further, he says, that the soldiers and sailors in general average now from 3 to 5 kg. in weight more than when the war opened, notwithstanding their physical work. The present ration allows considerable liberty of choice, and consists of 130.5 gm. protein; 45 gm. fats and 535.5 gm. carbohydrates. This provides 3,149 gross calories or, including the wine ration, 3,329 calories. The Japanese war ration, he adds, includes from 108.67 to 123.96 gm. protein; from 6.11 to 15.96 gm. fats and 766 gm. carbohydrates. Rho adds that the more vegetable and fruit diet of the Italians in peace times should not be regarded as a token of inferiority but the reverse, a title of hygienic and physiologic superiority. As Alfieri said, "The plant, man, thrives better in Italy than elsewhere." A change to city life and meat eating can be a change only for the worse.

76. **Treatment of Chronic Myocarditis and Arteriosclerosis.**—Marfori ascribes great importance to dictetic treatment. Of the various drugs he has used, camphor has proved most effectual in regulating the heart rhythm. It seems to have a direct stimulating action on the formation of the heart impulse, stimulating the nodal system, that is, the Keith-Flack node. This direct biologic action of camphor differs in nature and seat from that of any other heart tonic. Camphor has no influence on the cardiac innervation. It dilates the blood vessels, thus reducing the pressure in the right ventricle and facilitating the circulation in the lungs and elsewhere, bringing down the blood pressure. This action of camphor has not been appreciated hitherto as the tests of it made on the normally regular heart showed no effect. It does not seem to exaggerate normal functioning nor exhaust the reserve force, but merely brings up to normal a lagging nodal system. Zangger's recent research and clinical experience have confirmed Marfori's assertions in this line, published a few years ago, which time is corroborating. Camphor has to be given for months and years, with intermissions, to influence the disease permanently. He usually begins by subcutaneous injection of camphorated oil (0.10 gm. in 1 gm.), continuing the drug by the mouth, sometimes associated with nux vomica or valerian. It may be given with other heart tonics as in the formula; 15 gm. each of tincture of strophanthus and tincture of nux vomica, with 2 gm. pulverized camphor. The dose is from 10 to 20 drops twice a day, suspending for a week after taking for fifteen days. Professor Marfori is director of the Instituto di Farmacologia e Terapia of the University of Naples; he has made for years a special experimental and clinical study of camphor. In this article he reviews also the action of several other drugs that influence the heart.

Brazil Medico, Rio de Janeiro

June 22, 1918, **32**, No. 25

80 Trichomonas Chagasi n. sp. Hasselmann and O. da Fonseca.—p. 193.

June 29, 1918, **32**, No. 26

81 Gregarina Watsoni n. sp. C. F. Pinto.—p. 201.
82 Principles and Practice of Hydrotherapy, Myotherapy and Dietetics in Obesity. G. Armbrust.—p. 201. Conc'n.

Medicina Ibera, Madrid

June 15, 1918, **3**, No. 32

83 Etiology of Influenza. F. Coca.—p. 297.
84 Herpes Zoster. F. de la Portilla.—p. 299.

June 29, 1918, **3**, No. 34

85 *Membranous Pericolitis. J. Blanc y Fortacin.—p. 355.
86 Chyliform Pleural Effusion. S. A. Echevarria.—p. 356.
87 Means to Promote the Physical Development of Children. M. B. Ansart.—p. 378.

85. **Membranous Pericolitis.**—Blanc operated in a case of abdominal pains and obstipation amounting to transient total obstruction on two occasions. He found the cecum covered with a network of fibrous tissue like a fine fibrous and vascularized membrane. At some points it squeezed up the

bowel into folds like an accordeon. In some similar cases on record the tract of bowel involved was resected, as it was assumed that the fibrous network might reproduce itself if the fibers were merely cut. But Blanc did not consider himself justified in doing this. He merely cleared away the network, leaving the cecum and colon entirely free. The patient's previous disturbances disappeared at once, showing that the network had been unmistakably responsible for them. A month later hematemesis and melena developed, and the patient proved to have a cancer involving both stomach and pancreas. Blanc is inclined to incriminate this malignant disease in the origin of the fibrous network, the irritation from the hitherto clinically latent cancer having induced the production of the fibrous membrane at some little distance. Even if the membrane was of congenital origin, it might have caused no disturbances until some irritation or inflammation in some connected area might have aggravated it to assume pathologic proportions.

86. **Chyliform Pleural Effusion.**—Echevarria's patient was an unmarried woman of 42 inclined to recurring bronchitis and hyperchlorhydria, who developed a pleural effusion which required tapping two or three times and was of chyliform aspect but did not contain any droplets of fat. No microbes could be discovered in it but the presence of endothelial cells and others, larger, with a large central vacuole suggested cancer. This was confirmed by the course of the case, the pleural effusion proving to have been due to a secondary localization from a cancer in the stomach which had been developing insidiously until this time. The first clinical phase of the malignant disease was exclusively on the part of the respiratory apparatus.

Semana Medica, Buenos Aires

March 7, 1918, **25**, No. 10

88 Colloidal Metals and Intravenous Medication. A. Guaita.—p. 255.
89 *Death Rate from Tuberculosis at Buenos Aires. E. R. Coni.—p. 261.
90 Necessity for Training Nurses for the Army. J. A. Lopez.—p. 264.
91 Psychopathology in Relation to Social Sciences. F. Del Greco.—p. 268.

May 30, 1918, **25**, No. 22

92 Hygienization of Milk. E. R. Coni.—p. 610.
93 *After Cesarean Section. V. Morinelli.—p. 612.
94 Tuberculosis Death Rate at Buenos Aires. E. R. Coni.—p. 624.

89. **Tuberculosis at Buenos Aires.**—Coni analyzes the death rate from tuberculosis grouping it by nationalities, ages and wards. His figures show a number of actual foci of infection. Of the total 3,254 deaths from tuberculosis last year, three-fifths occurred in the hospitals and 42.4 per cent. of the tuberculous had come up from the provinces to the city.

93. **After Cesarean Section.**—Morinelli discusses the obstetric and gynecologic outlook for women after cesarean section. His article is based on 202 cases of cesarean section collected from various Argentine clinics, with the case histories of 140 of the women. In the uncomplicated cases the mortality was about that of all laparotomies done for noninflammatory processes, namely, 5.5 per cent. In the suspected cases, the mortality ran up to 13 per cent. The morbidity and mortality of symphysiotomy are less than those of tardy cesarean section, with which alone it competes. When symphysiotomy is considered, the time for the classic cesarean is past. From the experiences related, the suture for the uterine wall which gave the stoutest cicatrix and the least adhesions was with catgut in three tiers. It seems logical to sterilize a woman when a second cesarean section is required. This occurred in some of the cases reported, but Morinelli has become convinced by the experiences related that it is better to sterilize the woman at the first cesarean section when she is syphilitic, tuberculous or has chronic kidney or heart disease.

Nederlandsch Tijdschrift voor Geneeskunde, Amsterdam

July 13, 1918, **2**, No. 2

95 *Congenital Defects in Skull. J. W. T. Willink.—p. 70.
96 *Fracture of Long Bones. W. F. Wassink.—p. 78.
97 The Organized Profession and Social Medicine. E. J. Buning.—p. 86.
98 Botulism. J. Gewin.—p. 89.

95. **Defect in the Skull.**—The gap in the skull was of symmetrical outline and the convolutions of the brain were distinctly manifest at first through the thin layer of epithelial cells. The analogous cases on record are reviewed. Anomalies of this kind seem to be the result of disturbance in the development of the mesoblast. Willink loosened up the scalp and sutured it over the gap which was nearly 4 cm. square, and the infant seems to have developed normally since.

96. **Fracture of Bones in the Leg.**—Wassink argues that the methods of treating simple fracture of the leg bones seldom give satisfactory results. His analysis of his own experiences and series reported by others confirms that recovery was more rapid in the cases in which immobilization was less thorough and prolonged, while the joints were left less stiff, and there was less tendency to edema. Absolute immobilization is not necessary for the growing together of the stumps, and sometimes it is directly contraindicated. It may be useful, just before final consolidation is complete, to apply absolute immobilization for a short time. The effect on the patient is much better when prolonged immobilization is not aimed at; he is not condemned to absolute idleness over such a long period.

Hospitalstidende, Copenhagen

July 17, 1918, **61**, No. 29

99 *Treatment of Paralytic Dementia. G. E. Schrøder and H. Helweg.—p. 945.
100 *Treatment of Epilepsy. A. Bisgaard, E. Jarløv and J. Nørvig.—p. 960.

99. **Subdural Injections of Arsphenamin in Treatment of General Paresis.**—Ten cases are reported in which treatment was with subdural injection of neo-arsphenamized serum after trephining. The injections were kept up alternately by the vein and subdural, at intervals of two weeks or a month. It seems as if the finding of spirochetes in the brain justifies this subdural treatment. In the majority of the cases described the disease was of too long standing for much hope of benefit; but in three cases the disease seemed to have been arrested. In four cases, however, the subdural injection was followed by paresis of the arm and later of the leg, on the other side, evidently from the irritating of the meninges by the drug. It would have been better to use it in a weaker dilution. It is possible that series of repeated examination of the spinal fluid may reveal certain forms of the disease more amenable to treatment.

100. **Treatment of Epilepsy.**—Bisgaard and his co-workers have been studying the chemical reactions of urine and blood in epileptics during and after seizures and in the intervals. The alveolar carbon dioxid tension and electrometric determination of the concentration of oxygen ions coincide in demonstrating as a seizure impends an increase in the blood and urine of substances giving an alkaline reaction. During the seizure and afterward there is a pronounced turn to an acid reaction. They interpret the acid reaction as an effort on the part of Nature to restore the normal balance between the alkaline and acid reactions. Certain data presented render this assumption plausible, and suggest that in treatment of epilepsy efforts should be made to combat the pathologic tendency to alkalinity. This might be realized by giving acids or other substances to increase the oxygen ion content of the blood, or accomplish the same by dietetic means or physiotherapy. They emphasize the close concordance between the chemical reactions in blood and urine as they veer from normal to alkaline while the seizure impends. Then both veer to acid during and after the seizure. The conflicting findings in the literature were due in large part to the unreliability of the older technics applied. All the testimony to date indicates that the composition of the urine undergoes certain abnormal changes, by which the degree of acidity is materially altered.

Hygiea, Stockholm

June 30, 1918, **80**, No. 12

101 *Erreur de Sexe. T. Lunden.—p. 705.

101. **Pseudohermaphrodism.**—Lunden was consulted by a young woman on account of a painful swelling in the groin. Examination showed the genital organs to be those of an

external male pseudohermaphrodite, but the general aspect was altogether feminine. The swelling in the groin was the undescended testicle. Two of the three sisters were of the same external male pseudohermaphrodite type, and probably likewise a maternal aunt. Lunden discusses the physician's conduct in such cases of *erreur de sexe*. He advocates removing the testicles, as they are liable to undergo malignant degeneration. The patient should be informed, he thinks, that there is malformation which would prevent child bearing, and consequently that she should not marry. It is better not to specify the nature of the malformation.

Norsk Magazin for Lægevidenskaben, Christiania

July, 1918, **79**, No. 7

102 *Phenolsulphonephthalein Test of Kidney Functioning. K. Motzfeldt.—p. 729.
103 *Treatment of Eclampsia. K. Brandt.—p. 765.
104 *Double Uterus Bicornis. K. Haugseth.—p. 781.
105 *Invagination of Child's Intestine. N. Barth.—p. 784.
106 Breaking Up of Pleural Adhesions. W. Holmboe.—p. 799.

102. **Phenolsulphonephthalein Test of Kidney Functioning.**—Motzfeldt reviews the literature on the phenolsulphonephthalein test and his own experience with 212 applications of the test on 136 patients at the Rikshospital. Only 61 of the patients had kidney disease. In 54 with sound kidneys, from 40 to 70 per cent. was eliminated during the first two hours: the average was 65 per cent. and it was never below 50 per cent. The elimination was entirely independent of the amount of urine during the two hours, the percentage keeping the same when the subjects had been drinking a liter of water half an hour before the test, as also in a case of renal dropsy in which the output of urine increased from 1,500 c.c. one day to 8,000 c.c. a few days later. The phenolsulphonephthalein output was 35 per cent. on both these days. The findings in the 61 patients with nephritis are tabulated under different headings, and are compared with the symptoms observed.

He extols the simplicity and reliability of the test; a positive response testifying to functional impairment of the kidneys. Nephritis may exist without appreciable functional impairment, and hence negative findings do not exclude nephritis. He found evidences of retention of nitrogen in every case when the output of the phenolsulphonephthalein was below 25 per cent. The test is thus peculiarly useful in differentiating between the true and the spurious form of uremia, the *azotémie* and *chlorurémie* of the French writers. On the other hand, there is no connection between the elimination of phenolsulphonephthalein and albuminuria, edema or high blood pressure.

103. **Eclampsia.**—Brandt analyzes the twenty-seven years' record of the Christiania obstetric and gynecologic clinic. It includes 431 cases of eclampsia. In the 156 cases since 1906, there was a mortality for the mothers of 14.1 per cent. and for the children of 27.3 per cent. in the 121 cases in which the eclampsia developed before or during labor. The figures are, respectively, 25.7 and 2.5 per cent. in the cases with postpartum eclampsia. The Stroganoff prophylactic method is applied as the routine measure, that is, keeping the woman under the influence of moderate doses of morphin and chloral and protecting her against noise and light. Venesection is done when necessary, and also lavage of the stomach. Otherwise she is left in peace. If the convulsions keep up, Brandt does not push this Stroganoff method to the extreme, but delivers the woman under deep ether anesthesia, with forceps, cesarean section or otherwise as indicated. One great advantage of the Stroganoff treatment is that the general practitioner can apply it with the help of the obstetric nurse, who can keep him posted by telephone as to the patient's condition. Some recent German publications report from the Charité at Berlin 17.2 per cent. mortality in 501 cases of eclampsia, before 1912, given purely operative treatment. Since then, 168 cases given the Stroganoff and venesection treatment showed a mortality of 14.3 per cent. for the mothers and 36 per cent. for the children. Pregnancy eclampsia was found to give the most unfavorable results. Bumm also has reported that operative treatment has not fulfilled expectations, and since 1911 treatment has been expectant. The pure Stroganoff treatment in his hands gave 44 per cent. mortality. The total mortality in 567 cases was 17.3 per cent. Necropsy revealed irreparable changes in liver, kidneys and brain. It is stated that venesection is called for only in pregnancy eclampsia. In institutions, primary operative treatment seems to be preferable.

104. **Double Uterus.**—In removing an ovarian cyst, Haugseth accidentally discovered that there was a duplex uterus bicornis with vagina septa. The woman had had seven pregnancies with five living children. The pregnancies had evidently alternated in the halves of the uterus.

105. **Intussusception in Children.**—Barth became convinced in 1902 that he had overlooked some cases of intussusception, and since then he has been on the lookout for it in every small child brought to him on account of gastro-intestinal disturbance. He has thus encountered five cases in recent years. In two he succeeded apparently in reducing the invagination but the child died in twenty-four or forty-eight hours. In another case the invagination was of several days' standing and the laparotomy came too late to save the child. Another child had evidently had repeated attacks of invagination which had spontaneously corrected itself. In the latest attack the bowels were flushed with water. Then the invagination was easily corrected through a laparotomy but the child collapsed and died next day, probably from absorption of virulent infectious matter by the damaged mucosa. It is evident that nonoperative measures cannot be counted on after twenty-four hours and, on the other hand, a laparotomy gives the best results when done within twenty-four hours. Even when the invagination seems to have been corrected, it may merely have slid behind the liver. Necropsy revealed this in four of Bloch's cases. Or the invagination may have been corrected, but the swollen bowel and mesentery may simulate a tumor. Passage of flatus and stools is the best sign of reduction of the invaginatum, but this does not occur for several hours. Bloch flushes the bowel with water and measures the quantity of water that can be introduced and flows out again. If the intussusception still persists (ileocecal and colon) only from 50 to 500 c.c. will run in, while if the invaginatum has been reduced, up to a liter will flow in and out. This may aid in locating the tumor, as with an invaginatum in the small intestine as much as a liter will run in and out without any change being apparent in the tumor.

Ugeskrift for Læger, Copenhagen

July 18, 1918, **80**, No. 29

107 *The Blood in Scarlet Fever. S. Baastrup.—p. 1121.
108 Artificially Carbonated Baths. S. Marcussen and A. Faber.—p. 1142.

July 25, 1918, **80**, No. 30

109 *Traumatic Lumbago. K. Malling.—p. 1177.
110 *The Coarse Bread Question. M. Hindhede.—p. 1182.

107. **The Blood in Scarlet Fever.**—Baastrup tabulates the hematologic findings in fifteen patients with infectious sore throat; in ten with scarlet fever with the blood examined repeatedly during the whole course of the disease, and in eighty-seven scarlet fever patients whose blood was examined at different times during the disease. It is evident that the pronounced leukocytosis and eosinophilia even from the first will aid in differentiating scarlet fever from infectious sore throat. Leukocytosis with very few or no eosinophil cells, turns the scale in favor of simple angina. After defervescence, the combination of leukocytosis and eosinophilia will permit the retrospective diagnosis of scarlet fever. Neither alone is decisive, but the presumption still is in favor of scarlet fever.

109. **Traumatic Lumbago.**—Malling warns against casual remarks which may sow the seed of a traumatic neurosis. He admonishes further that roentgen examination may clear up these cases surprisingly. In some cases described this revealed actual injury of a vertebra. In three of the cases there was history of an external trauma; the pain had developed after lifting a heavy weight or slipping on ice.

110. **The Coarse Bread Question.**—Hindhede replies to Leersum and other critics of his publications on the assimilation of coarse bread. A number of them have been summarized in these columns during the last two years.